A window open on the world

The UNESCO Courier

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CAN WE KEEP OUR PLANET HABITABLE?

Photo
Layout

TREASURES OF WORLD ART 30

At ease beneath a tree

A flashback to nomadic life in Siberia nearly 2,500 years ago, this Scythian cast gold relief (5 in. by 6 in.) is a striking example of the rich metalwork with which these early people of the steppes decorated their persons and possessions. Hunters and herdsmen, the Scythians created and developed in south-east Europe and western Asia an original culture in which art enjoyed pride of place. In this plaque showing two saddled horses and three riders at ease beneath a tree, a Scythian artist has captured a moment of repose in an errant existence in the vastness of the step

The Hermitage Museum, Leningrad — Photo © Michel

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TO OUR READERS

On the threshold of the New Year, the UNESCO COURIER is happy to extend Season's Greetings to all its readers in more than 125 countries. In the months ahead, the international staff of Editors will seek to present a broad panorama of major international problems in science, education, the arts and communication.

With this issue the UNESCO COURIER appears in a very slightly reduced format (a fraction of an inch) necessitated by a change in the offset rotary presses used by our printers. The economies thus effected will enable us to maintain our current sales price despite the considerable rise in printing costs during the past year. This modification in format in no way reduces the editorial space of the magazine.

Page	
4	**CAN WE KEEP OUR PLANET HABITABLE?** *By Michel Batisse*
7	**THE BIOSPHERE** A delicate balance between Man and Nature *By René Dubos*
17	**A BIOLOGIST LOOKS AT THE ANIMAL WORLD (BEASTS AND MEN)** *By Jean Dorst*
22	**FROM NATURE'S PARADISE**
24	**MAN AGAINST NATURE (1)** *By Frank Fraser Darling*
28	**(2) THE DEAD LAND OF THE WITHERED TREES**
35	**(3) POLLUTION, THE NUMBER ONE PROBLEM**
38	**(4) BLUEPRINT FOR PLANETARY MANAGEMENT**
37	**WATER POLLUTION AND THE LAW**
40	**UNESCO'S PROGRAMME FOR 1969-70**
42	**LETTERS TO THE EDITOR**
2	**TREASURES OF WORLD ART** At ease beneath a tree (U.S.S.R.)

Cover photo

Photo © F. Bel - G. Vienne - Jacana, Paris

This dying auk with its oil-matted plumage was photographed on a Brittany beach following the wreck of the tanker, "Torrey Canyon", in March 1967. Hundreds of thousands of sea birds, unable to fly or search for food, perished in the sea and along the Channel coasts. In France, almost all of the puffins, guillemots and auks in the Sept Isles wildfowl reserve off the coast of Brittany were wiped out. The disaster focused world attention on the growing hazard of heavy oil pollution of the sea and the secondary evil of detergents used to combat the oil. Many other man-made dangers today threaten the air, water and our whole environment.

Many of the fictional places described in the works of the American novelist William Faulkner were actually modelled on localities in Lafayette County, Mississippi, Faulkner's lifelong home. The United States is one of the countries which have made the greatest efforts in nature conservation. Nevertheless, many of the places that Faulkner knew, including forest areas, have been destroyed or altered in the continuing process of land-clearing and modernization. These starkly-outlined trees with their mutilated trunks are all that remain of a once luxuriant forest after the construction of a dam.

CAN WE KEEP OUR PLANET HABITABLE?

by Michel Batisse

Photo © Martin J. Dain

FOR more than 40,000 years, *Homo sapiens* has applied himself, patiently, laboriously, unremittingly, to the task of conquering his planet, extending his dominion over all other creatures and taming the vast forces of nature.

From this, at the start, foolhardy and unequal contest, he has emerged victorious. Not a single corner of the globe has escaped his scrutiny; no species of animal has held out against him. He has imposed his will on rivers and even the seas. He has swept away forests and replaced them with crops. Today he rockets into space. He seems to have achieved total victory—too total to be lasting.

Until a few decades ago the triumphant progress of a technological civilization based on scientific knowledge seemed to confirm man's total victory. Then, all at once, danger signals were observed. In a brief period of his relatively short history, man, a "Johnny-come-lately" on earth, has so effectively conquered nature that he is now in the process of destroying it.

Hasty felling of forests to clear new land for crops; swift and reckless encroachment on the countryside to make place for tentacular cities, factories, highways and aerodromes; destruction and erosion of the soil; pollution of air and water; disappearance of wildlife; accumulation of waste products and mounds of rubbish; defacement of rural scenery; the increasing poisoning of our planet—all are the bitter fruit of man's technological skill, of the exponential rate of increase in population and the modern mystique of productivity.

These too are the mortal dangers that threaten the thin layer of the earth known as the biosphere—the meeting point of land, air and waters where life can exist, the environment on which man depends inescapably for his survival.

In view of this increasingly critical situation, Unesco, in September 1968, called an intergovernmental conference of specialists to study the ideas of modern science on the rational use and conservation of the resources of the biosphere and to propose measures for national and international action.

The Conference on the Biosphere was organized in co-operation with the United Nations, the Food and Agriculture Organization, the World Health Organization, the International Biological Programme and the International Union for Conservation of Nature and Natural Resources. It brought to the Paris headquarters of Unesco, 240 delegates from 62 nations and 90 representatives from international organizations.

It is not the first time that scientists have taken up these problems, but the Paris conference was the first occasion on which representatives of governments have met to appraise the world situation and to initiate steps for remedial action.

Conference discussions revealed a striking identity of views on the causes and gravity of problems posed by the deterioration of our planetary environment. The conclusions reached are rigorous: the situation is degenerating rapidly and far more dangerously than most people realize, especially city people who have forgotten to what extent they depend on nature and its resources. Urgent action is needed.

But do remedies in fact exist? On this extremely complex question, the

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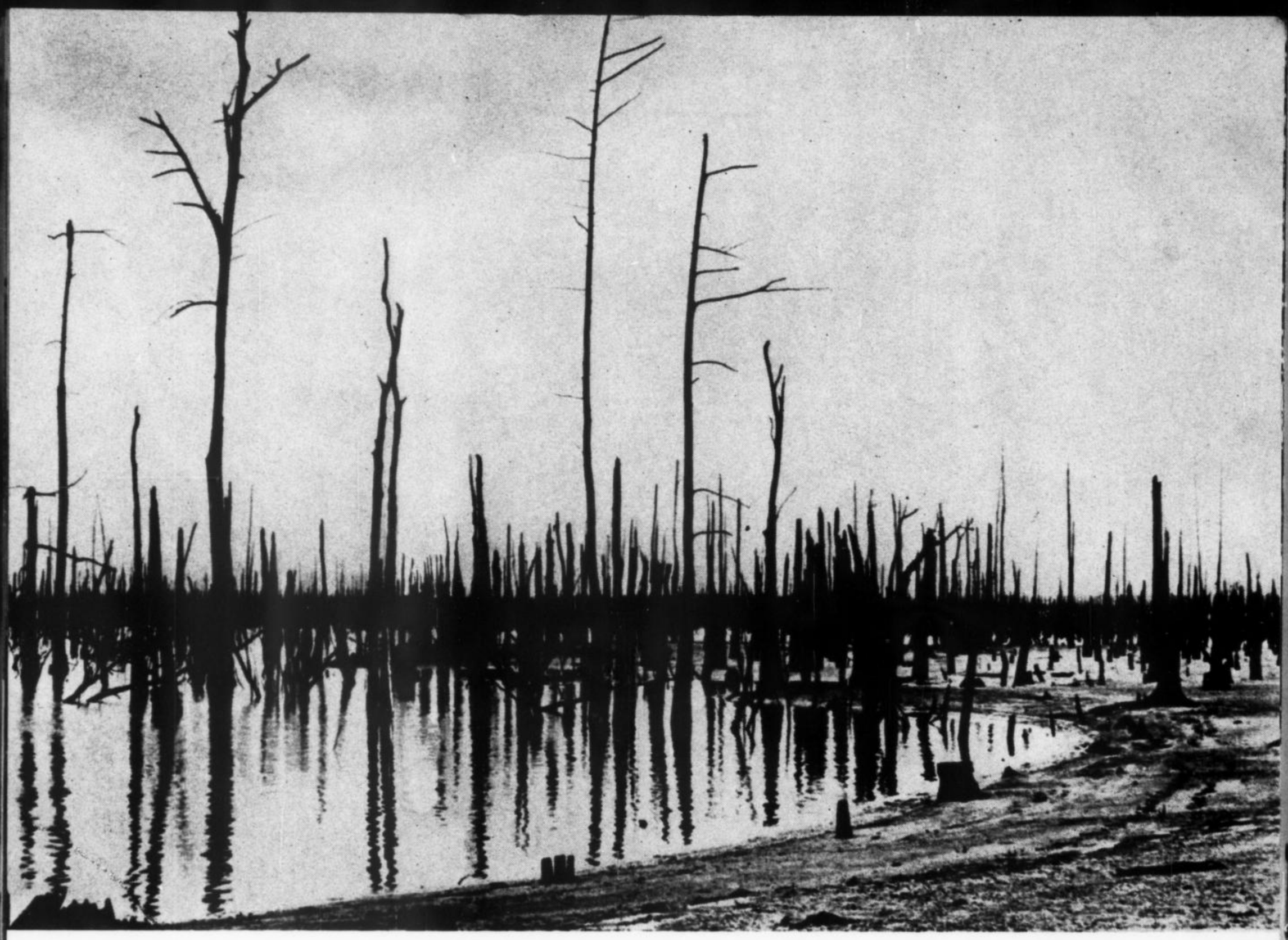
MICHEL BATISSE, *engineer and physicist, is head of the Division of Natural Resources of Unesco's Department of the Advancement of Science.*



conference could do no more than formulate general principles and lay down guidelines for action to be taken without delay.

EVERYTHING would be simpler, no doubt, if there were not so many people in the world and if their needs were fewer. That is the viewpoint of certain "conservationists", who yearn for a Golden Age and Paradise on Earth.

The conference, on the contrary, concluded that it is indeed possible to reconcile the needs of man with the preservation of nature, and that the only realistic attitude is one which endorses a "rational utilization" of natural resources, it being understood that rational utilization comprises all the imperatives of conservation so as to ensure the continuity of the world's resources.

Protection of threatened plants and animals, creation of national parks and reserves, campaigns against erosion, contamination and pollution are thus fundamental to a policy of rational utilization of our natural resources.

Similarly, studies of biological productivity in natural environments could provide a sound scientific basis for decisions on land use, the most fertile areas being reserved for farming, others being earmarked for urban development, highways, afforestation, recreation facilities and so on.

While emphasizing that the quantitative needs of productivity must be met, the conference reaffirmed man's own important need to preserve—or restore—the quality of his environment, by combatting pollution of every kind and through a reconciliation with nature.

Science, that is, clear understanding of natural phenomena and the consequences of man's own actions, offers solutions to the multiple problems posed by this reconciliation. New research will thus be needed, in which all branches of the natural and social sciences could collaborate.

If present knowledge and experience were applied effectively, it would help to solve many of our current difficulties. But a tremendous effort in public information and education, aimed at every level and every age group of the population, is indispensable if we are to reverse today's trends and find a way out of the present impasse without losing time.

In practical terms, the conference asked Unesco to map out a long-term, international and interdisciplinary programme based on its final recommendations. This programme on "Man and the Biosphere" will deal with scientific, technical, educational and institutional problems relating to the rational use of natural resources and the improvement of the environment. It will be submitted for approval to Unesco's General Conference at its next meeting in October 1970.

The success of this programme will depend, in the final analysis, on the determination shown by peoples and governments of all countries. The organization of mankind and the level of its political maturity lag far behind its technological potential. Nevertheless, it is imperative, while there is still time, for man to embark on a rational renovation of his planet.

The Conference on the Biosphere brought home a fundamental truth. In freeing himself from the forces of nature by his ingenuity and skills, man has become his own worst enemy, the greatest threat to his own survival. His vainglorious power has brought him face to face with a new and fundamental responsibility: the future of the human race on Planet Earth.

Photo © G. Ehrmann - Réalities

6 **With his hands and his ability to make and use tools, man has gradually built his civilization and transformed his world. But in the process he has heedlessly destroyed much of his natural heritage. Photo shows a unique piece of craftsmanship: gloves wrought in gold for the hands of the emperors of the pre-Inca Chimu civilization. Of 13th-15th century origin, they were found in 1962 near Lima (Peru).**

THE BIOSPHERE

a delicate balance between Man and Nature

The Biosphere is a new word which every thinking individual today ought to make part of his vocabulary. It means the thin layer of air, water and land on our Planet Earth where life exists. The article below describes how man's exploitation of nature and his environment has affected the delicate balance of the Biosphere. It is based on an important study prepared by the American biologist, René Dubos, who benefitted from the findings of an international panel of experts including Dr. François Bourlière, professor of gerontology at the Faculty of Medicine, Paris, and president of the International Union for Conservation of Nature and Natural Resources; Marion Clawson, director of the Land-Use and Management Programme for Resources of the Future, Washington; the British ecologist Frank Fraser Darling (see page 24), and specialists from Unesco, the Food and Agriculture Organization and the World Health Organization. The study was presented as a basic text to the international conference on Man and the Biosphere, held in Unesco, Paris, in September 1968.

by René Dubos

ALL men are migrants from a common origin. Their various races have undergone minor modifications during prehistoric and historic times as a result of the migrations that exposed them to different environmental factors and led them to adopt different ways of life.

But on the whole, their genetic endowment is still much the same as it was several tens of thousands of years ago. Furthermore, there is no indication that it will change significantly in the near future, because the normal process of genetic evolution is much too slow, even though natural selection is still at work. For this reason, human life can be sustained only within the fairly narrow range of physical and chemical limits that fit the anatomic and physiological characteristics of *Homo sapiens*.

The fact that modern man is constantly moving into new environments gives the impression that he is enlarging the range of his biological adaptabilities and thus escaping from the bondage of his evolutionary past. But this is an illusion. Wherever he goes, and whatever he does, man can function only to the extent that he maintains or creates around himself a micro-environment similar to the one within which he evolved.

He moves at the bottom of the sea or in outer space only if he remains linked to the earth by an umbilical cord or is confined within enclosures that almost duplicate the terrestrial atmosphere. He can survive in environments polluted with chemicals, noise, and excessive stimuli, but he retains physical and mental health only if he protects himself by devices that shelter him from these environmental pollutants.

Granted these biological limitations, it remains true on the other hand that man is today as adaptable as he was during the late Stone Age when he established settlements over much of the earth. During the past few decades, countless persons have survived the frightful ordeal of modern warfare or of concentration camps.

Under normal conditions, the biological mechanisms of adaptation are powerfully supplemented by mechanisms that do not require any change in man's biological nature. All over the world, the most crowded, polluted and brutal cities are also the ones which have the greatest appeal and in which population is increasing the fastest. Economic wealth is being produced by men and women working under extreme nervous tension amidst the infernal noise of high-power equipment, typewriters, and telephones, in atmospheres contaminated with chemical fumes or tobacco smoke.

Because man is endowed with such remarkable ability to tolerate conditions profoundly different from the ones under which he evolved, the myth has grown that he can endlessly and safely transform his life and his environment by technological and social innovations; but this is not the case. On the contrary, the very fact that he readily achieves biological and sociocultural adjustments to many different forms of stress and of undesirable conditions paradoxically spells danger for his individual welfare and for the future of the human race.

Man can achieve some form of tolerance to environmental pollution, excessive environmental stimuli, crowded and competitive social contacts, the estrangement of life from the natural biological cycles, and other consequences of life in the urban and technological world. This tolerance enables him to overcome effects that are unpleasant or traumatic when first experienced. But in many cases, it is achieved through organic and mental processes which may result in the chronic and degenerative disorders that so commonly spoil adult life and old age, even in the most prosperous countries.

Man can learn also to tolerate ugly surroundings, dirty skies, and polluted streams. He can survive even though he completely disregards the cosmic ordering of biological rhythms. He can live without the fragrance of flowers, the song of birds, the exhilaration of natural scenery and other biological stimuli of the natural world.

CONTINUED ON NEXT PAGE

RENE DUBOS *has devoted his entire life to the effects of the environment on man and the impact of human life on the environment. Professor of microbiology and experimental pathology at Rockefeller University, New York, he is the author of a score of books and studies on the subject, including "Man, Medicine and Environment" (Praeger, New York, 1968), "Man Adapting" (Yale University Press 1965), "Unseen World" (Rockefeller Institute Press, 1962), "Dreams of Reason: Science and Utopias" (Columbia University Press, 1960), "Mirage of Health" (Harper, New York, 1959; George Allen and Unwin, London, 1960; in paperback, Doubleday, New York, 1961), "So Human an Animal" (Scribner, New York, 1968).*

How many square feet per inhabitant?

This loss of amenities and elimination of the stimuli under which he evolved as a biological and mental being may have no obvious detrimental effect on his physical appearance or his ability to perform as part of the economic or technologic machine. But the ultimate result can be and often is an impoverishment of life, a progressive loss of the qualities that we identify with humanness and a weakening of physical and mental sanity.

Air, water, soil, fire, the rhythms of nature and the variety of living things, are of interest not only as chemical mixtures, physical forces, or biological phenomena; they are the very influences that have shaped human life and thereby created deep human needs that will not change in the foreseeable future. The pathetic weekend exodus to the country or beaches, the fireplaces in overheated city apartments, the sentimental attachment to animal pets or even to plants, testify to the persistence in man of biological and emotional hungers that developed during his evolutionary past and he cannot outgrow.

Like Anteus of the Greek legend, man loses his strength when his feet are off the ground.

WHILE the genetic endowment of *Homo sapiens* has not undergone any significant alterations since the late Stone Age, it is obvious that man's interaction with his environment has greatly changed with time and differs from place to place. The reason is that mankind as a whole possesses a wide range of genetic potentialities, most of which remain unexpressed under ordinary conditions. These potentialities are developed through the creative effects of the responses that each person makes to environmental stimuli.

Man cannot modify significantly the genetic constitution of the human race, but he has a large measure of control over the quality of human life because he has learned to manipulate the environmental factors which condition the detectable expressions of his genetic endowment. Individually and collectively, man makes himself through responsible choices at each moment of his existence.

In theory, all human beings have much the same essential biological needs; but in practice actual needs are socially conditioned and therefore differ profoundly from one human group to another. Even food requirements cannot be defined without regard to historical and social factors. The value of an article of food is not determined only by its content in protein, carbohydrate, fat, vitamins, minerals, and other chemical components.

A particular food has, in addition to its metabolic values, symbolic values which make it either essential or unacceptable to a particular group of persons depending upon their beliefs and past experiences. These symbolic aspects of nutrition are not of importance only among primitive people. Americans are even more reluctant to eat horse meat than Frenchmen are to eat cornbread.

Furthermore, needs are not unchangeable. Some which appear almost essential today may become trivial in another generation, not because man's biological nature will change, but because the social environment usually undergoes rapid and profound modifications. It may turn out for example that the individual motor car will progressively disappear if driving loses its appeal because of traffic congestion or boredom, and if people learn to use more of their leisure time within walking distance of their homes.

The individual detached house so characteristic of the North American continent may also become obsolete once home ownership loses its symbolic meaning of economic and social independence by reason of more generalized prosperity and financial security. Changes in automobile usage and in housing habits would probably have enormous effects on the fate of land areas, as would of course changes in the methods of food production.

The phrase "essential need" is therefore meaningless because in practice people need what they want. As technological civilization develops, needs are determined less and less by the fundamental biological requirements of *Homo sapiens* and more by the social expectations.

These expectations are created by the environment in which man lives and especially in which he has been brought up. The members of a given social group generally come to desire, and consequently develop a need for, whatever is regarded as most desirable by the group. The good life is identified with the satisfaction of these needs whatever their biological utility.

Wants become needs not only for individual persons, but also for whole societies. Elaborate religious institutions and ceremonies were apparently a need for the 13th century European towns, which devoted to the creation of churches and monasteries a percentage of their human and economic resources that appears extravagant to us in relation to the other aspects of medieval life.

Our own societies seem particularly concerned with creating a middle-class materialism with a veneer of uplifting platitudes. This creates its own pattern of costly demands irrelevant to biological necessity—for example costly carbonated beverages and narcotizing television programmes.

THE environments men create through their wants constitute to a very large extent the formula of life they transmit to succeeding generations. Thus, in addition to affecting present-day life, the characteristics of the environment condition young people and thereby determine the future of society. It is unfortunate therefore that we know so little and make so little effort to learn how the total environment affects the physical and mental development of children, and how much of the influence persists in adult life.

There is no doubt that the latent potentialities of human beings have a better chance of being realized when the total environment is sufficiently diversified to provide a variety of stimulating experiences, especially for the young. As more persons find the opportunity to express a larger percentage of their biological endowment under diversified conditions, society becomes richer and civilizations continue to unfold.

In contrast, if the surroundings and ways of life are highly stereotyped, the only components of man's nature that can become expressed and flourish are those adapted to the narrow range of prevailing conditions.

Historically, man was very slow to expand his horizons and develop his full genetic potential. Thus, surrounding early man with nature does not seem to guarantee a rich, diverse existence. Furthermore, in some present rural areas of the developed countries, man has produced a monotony of both crops and culture that stifles human development.

The present trends of life in prosperous countries are usually assumed to represent what people want; but in reality the trends are determined by what is available for choice. What people come to want is largely determined by the choices readily available to them early in life. Many children growing up in some of the most prosperous suburbs of industrialized countries may suffer from a critical deprivation of experiences and this determines the triviality of their adult lives. In contrast, some poor areas of the world

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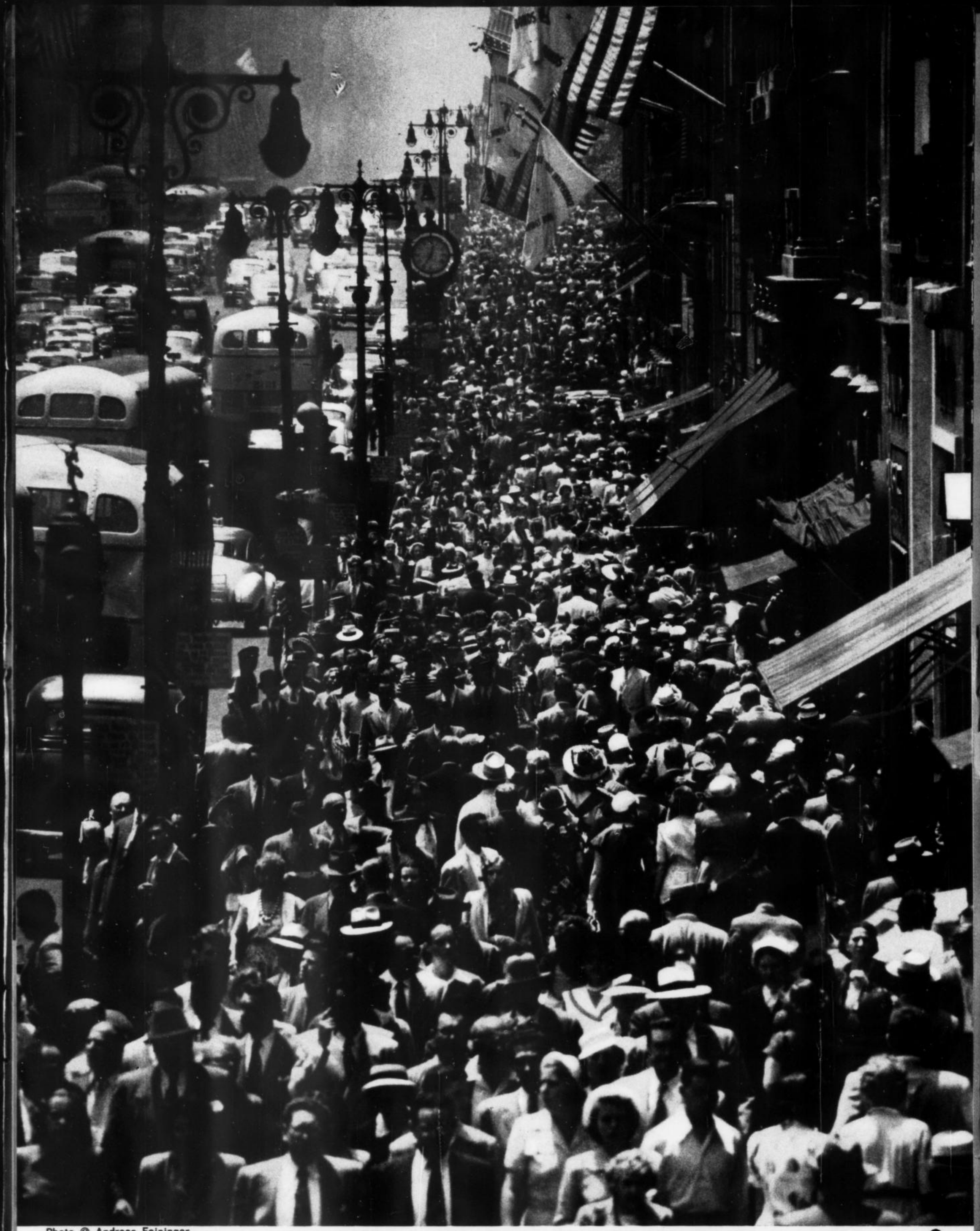

Photo © Andreas Feininger

By 2000 A.D. it is estimated that the world's population will reach the 7,000 million mark. Many cities which today have several million inhabitants will grow into vast megalopolises. Already afflicted by incessant noise, fumes and stress, modern city dwellers increasingly feel the need to escape from these "unnatural" living conditions and seek relief in the tranquility, clean air and open spaces of the countryside that have still been spared.

Man in a fish bowl

provide human environments that are so stimulating and diversified that many distinguished adults emerge from them despite the economic poverty of their early years.

There is no doubt, in any case, concerning the sterilizing atmosphere of many modern housing developments which are sanitary and efficient, but inimical to the full expression of human potentialities. All over the world, many of these developments are planned as if their only function was to provide disposable cubicles for dispensable people. Irrespective of their genetic constitution, most young people raised in such a featureless environment, and limited to a narrow range of life experiences, will suffer from a kind of deprivation that will cripple them intellectually and mentally.

In judging the human quality of an environment, it is essential to keep in mind that passive exposure to stimuli is not enough to elicit individual development. The stimulus becomes *formative* only if the organism is given a chance to respond to it actively and creatively. Amusement parks and zoological gardens, richly endowed as they may be, are no substitute for situations in which the developing child can gain direct experience of the world through active participation. Juvenile delinquency is probably caused to a very large extent by the failure of the modern world to provide opportunities for the creative expression of physical and mental vigour during a human being's most active period of development.

Man has been highly successful as a biological species because he is extremely adaptable. He can hunt or farm, be a meat-eater or a vegetarian, live in the mountains or by the seashore, be a loner or a team member, function under aristocratic, democratic, or totalitarian institutions, but history shows also that societies that were once efficient, because highly specialized, rapidly collapsed when conditions changed. A highly-specialized society, like a narrow specialist, is rarely adaptable.

Cultural homogenization and social regimentation resulting from the creeping monotony of over-organized and over-technicized life, standardized patterns of education, mass communication and passive entertainment, will make it progressively more difficult to exploit fully the biological richness of the human species and may handicap the further development of civilization.

We must shun uniformity of surroundings as much as absolute conformity in behaviour and tastes. We must strive instead to create as many diversified environments as possible. Richness and diversity of physical and social environments constitutes a crucial aspect of functionalism, whether in the planning of rural and urban areas, the design of dwellings, or the management of individual life.

Diversity may result in some loss of mechanical and administrative efficiency and will certainly increase stresses, but the more important goal is to provide the many kinds of soil that will permit the germination of the seeds now dormant in man's nature.

IT is often assumed that progress depends on man's ability to *conquer* Nature. In reality, there exist throughout mankind biological and emotional needs that require not conquest of Nature, but rather harmonious collaboration with its forces. The ultimate goal of conservation policies should be to manage the environment in such a manner that it contributes to the physical and mental health of man and to the flowering of civilization.

Unfortunately, while there is much know-how concerning certain limited aspects of conservation practices, there is little understanding of what should be conserved and why. In fact, the goal should not be to conserve but rather to guide the orderly evolution of Man-Nature interrelationships.

Conservation certainly implies a balance between the multiple components of nature including man. This is a doctrine difficult to reconcile with the present trends of modern civilization, built on the Faustian concept that man should recognize no limit to his power. Faustian man finds satisfaction in the mastery of the external world and is engaged in endless pursuit of success for success' sake, even when he tries to reach the unattainable. No chance for balance here.

To be compatible with the spirit of modern civilization, the practices of conservation cannot be exclusively or even primarily concerned with saving parts of the natural world or man-made artifacts for the sake of preserving individual specimens of interest or beauty. Their goal should be the maintenance of conditions under which man can develop his most desirable potentialities.

Since man relates to his total environment and especially is shaped by it, conservation implies a quality of relationship rather than a static condition. Man must engage in a creative interplay with his fellows, animals, plants, and all the objects

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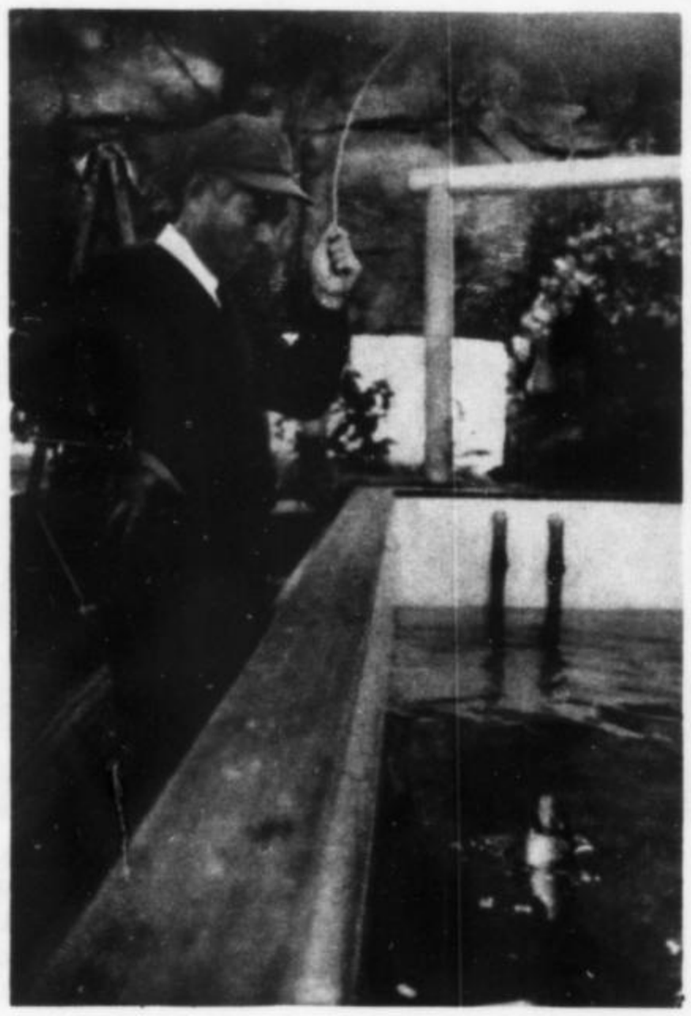

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THE PATIENT FISHER TAKES HIS STAND...

"It is an art worthy the knowledge and patience of a wise man," observed the English writer Izaak Walton, in his 17th century classic "The Compleat Angler". Above, thousands of fishermen gather on the ice of White Bear Lake (Minnesota) U.S.A. for an annual ice-fishing contest. This airview shows anglers concentrated within the igloo design on the ice, around which is a vast circle of competitors' cars. Left, piscatorial pleasures in the city. A Japanese angler tries his luck in one of Tokyo's indoor fishing pools. For the men, right, fishing is not a sport but their livelihood. Perched on stilt-like platforms, they are waiting on a south coast beach in Ceylon for the sardines to bite.

Photo © Life

A countryside adjusted to human limitations

of nature that directly or indirectly affect him, and which he affects.

From the human point of view, the total environment, including the remains of the past, acquires its full significance only when harmoniously integrated with the living tissues of man's life. It can even be demonstrated that because they shape irreversibly all aspects of human development, environmental forces are, so to speak, woven in man's physical and mental fabric.

The ill-defined meaning of the word Nature compounds the difficulty of formulating a scientific basis for the philosophy of conservation. If we mean by nature the environment as it would exist in the absence of man, then very little of it survives. Not even the strictest conservation policies could restore the primeval environment; nor would this be necessarily desirable if it could be done. Nature is never static. Physical forces and living creatures alter it continuously; animals especially modify parts of it to fit their biological and behavioural needs.

FOR animals as well as for men, the kind of environment which is most satisfactory is one with which they are familiar and in which they have introduced modifications that facilitate their biological and social life, such as territorial marks, trails for exploration, access to water supplies, retreats for mating, sheltered areas to protect the young. In general, the ideal conditions imply a complementary cybernetic relationship between a particular environment and a particular living thing.

Civilized nature should be regarded not as an object to preserve unchanged, not as one to dominate and exploit, but rather as a kind of garden to develop according to its own potentialities and in which human beings develop according to their own genius. Ideally, man and nature should be joined in a non-repressive and creative functioning order.

Nature can be tamed without being destroyed. Unfortunately, the word taming has come to imply subjugating animals and nature. Like men and animals, landscapes tamed in this manner lose their real essence, and become spiritless. To be biologically successful, taming demands the establishment of a relationship that does not deprive the tamed organism-man, animal or nature of the individuality that is the *sine qua non* of survival.

There are two kinds of satisfactory landscape. One is a landscape as little disturbed as possible by human intervention. The other kind of satisfactory landscape is one created by man and in which he has achieved harmony with natural forces. Most commonly, this has been achieved through centuries of interplay between human societies and the land on which they have settled.

What we long for most often is not nature in the raw, but a landscape adjusted to human limitations and expressing the aspirations of civilized life in its many different forms. For this reason, each people has its preferred landscape, constituting an integration and synthesis of natural forces and of cultural traditions.

Indeed, much of what we regard today as natural environment is in fact a product of history. The valleys of the Nile and Euphrates were shaped by human labour during the Neolithic period. And much of the arable land all over the world is also the product of man's management of the primeval forest.

Many of the plants now considered typical of the Mediterranean landscape, the olive tree for example, were in fact introduced from Iran. The tulip, which is now such a characteristic of the Netherlands, was first brought there from Turkey as late as the 16th century.

Irrespective of social changes, cities and their streets, the highways linking them, as well as the countryside surrounding them, also retain traces of the character imposed on them by early historical influences. The future development of new cities, especially in the U.S.A., is bound to be constrained by the grid-iron pattern and the network of highways that shaped their early growth.

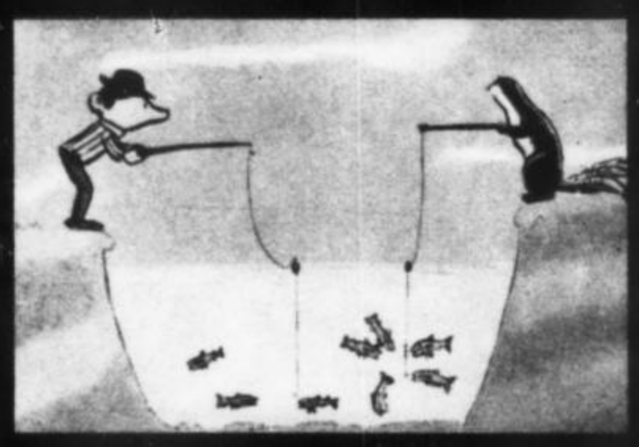
Since most of the environment as it exists today is a creation of man, and in turn influences the subsequent development of human societies, environmental quality must take into consideration not so much the preservation of the natural state, as the effects of the environment on the future of civilized life.

From this point of view, the situation looks very dark in most parts of the world. Everywhere, societies seem willing to accept ugliness for the sake of increase in economic wealth. Whether natural or humanized, the landscape retains its beauty only in the areas that are not valuable for industrial and economic exploitation.

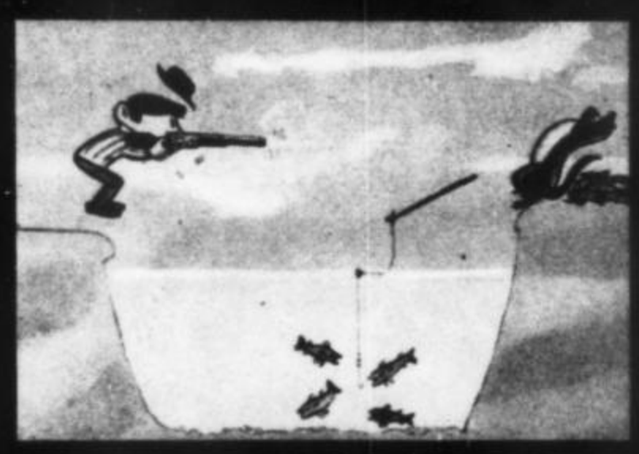
The change from wilderness to dump heap symbolizes at present the course of technological civilization. Yet the material wealth we are creating will not be worth having if creation entails the raping of nature and the destruction of environmental charm.

MR. OTTER AND THE UNWITTING FISHERMAN

What happens when man upsets one of the delicate balances in nature? This little story gives one example of the boomerang effect of man's spoliation of wildlife, in this case the harm caused by killing off the otter.



Mr. Otter loves fish and thus seems to be a big rival of the fisherman.



Mr. Fisherman thinks he is acting in the interests of all by killing the otter.

Mr. Fisherman finds his catch has dwindled seriously.

Mr. Otter caught mostly old or sick fish. When he was killed off, there were more sick fish to spread disease and the fish colony was decimated. Moral: Mr. Fisherman had unwittingly destroyed one of nature's safeguards against degeneration and epidemics, without which rivers would soon be depopulated.

Photos © from "La Protection de la Nature," a film strip prepared by L'Office de Documentation par le Film, Paris

In the past, the primeval wilderness progressively evolved into a humanized form of nature through the continuous "wooing" of the earth by peasants, monks, and princes. We must now learn to convert the drab wilderness generated by technology into a new kind of urbanized and industrialized nature worthy of being called civilized.

In the huge urban areas of the modern world we must supply the inhabitants with something more than amusement parks, highways for sightseers and paved grounds for weekend campers. No social philosophy of urbanization can be successful if it does not deal with urban man as part of the highly-integrated web which unites all forms of life.

There have been many large cities in the past, but until recent times their inhabitants were able to maintain fairly close and direct contacts with the countryside or with the sea, and thus could satisfy the physiological and psychological needs acquired during the human past. Historical experience, especially during the 19th century shows that urban populations are apt to develop ugly tempers when completely deprived of such contacts. Saving nature in both its wild and humanized aspects is thus an essential part of urban planning.

Wherever man has been successful in "wooing" the land and assuring its biological viability, success has resulted from his ability and willingness to plan his creations within the constraints determined by climate, topography, and other local characteristics of Nature. In the past, this was also true of cities which were planned in accord with certain geographical imperatives.

Modern cities are in contrast developing without any regard to physical and biological constraints and only under the influence of economic and political imperatives. The belief that man can "master" the environment and achieve independence of his innate biological limitations has generated the impression that there is no need for disciplines in the development of cities. Most urban problems derive precisely from such a misapplied interpretation of freedom.

Town planning as well as country planning will not be successful until we learn again to recognize and accept the restraints that are inherent in man's biological nature and in geographical conditions. In fact the whole concept of planning the use of our environment, or perhaps what is better described in French as "aménagement du territoire," is only emerging as a new discipline and it is high time that it be developed all over the world on sound ecological principles.

Rational environmental planning cannot be done by acting under the pressure of emergency as is now the general practice. Unfortunately, the construction of great dams all over

Photos © from "La Protection de la Nature," a film strip prepared by L'Office de Documentation par le Film, Paris

HOW BIRDS OF PREY PROTECT OUR CROPS

Locusts which destroy crops and vegetation are devoured by frogs. Frogs are preyed on by snakes, and snakes are hunted by birds of prey.

If birds of prey are destroyed, the snakes multiply and wipe out the frogs. The locusts then proliferate and devastate croplands. All birds of prey thus deserve protection.

the world is prompted not by comprehensive, integrated programmes of water and land use but by the threat of floods or of water shortages. Policies for the control of soil erosion are enacted only after irreversible damage has been done.

There is a general awareness of the dangers posed by noise, environmental pollution, and the misuse of drugs, but effective measures are rarely taken before some catastrophe creates an atmosphere of panic. In fact, most environmental programmes emerge as empirical adaptive responses to acute crises and usually take the form of disconnected palliative measures designed to minimize social unrest or the depletion of a few natural resources.

For lack of adequate knowledge, the environment is being manipulated almost exclusively on the basis of technological criteria without much concern for its biological and psychological effects. These effects should be considered not only in the here and now, but in their long-range consequences and in their relevance to mankind as a whole.

Before long, all parts of the globe will have been occupied or exploited by man and the supply of many natural resources will have become critical. Careful husbandry of the spaceship Earth rather than exploitation of natural resources, will then be the key to human survival.

Developing stations in outer space or on the bottom of oceans will not modify significantly if at all the physical limits of human existence. Man emerged on the earth, evolved under its influence, was shaped by it, and biologically he is bound to it forever. He may dream of stars and engage in casual flirtations with other worlds, but he will remain wedded to the earth, his sole source of sustenance.

As the world population increases, the topographical limitations of the spaceship Earth and the inevitable exhaustion of its natural resources will inevitably require that its economy be based on strict ecological principles. This imperative necessity however, is not yet widely recognized. The very word ecology (the interrelationships of organisms and their environments) was introduced into the scientific language only 100 years ago by Ernst Haeckel, the German biologist, so recent is the awareness that all components of nature are interwoven in a single pattern and that we too are part of the pattern!

Until now, man has behaved as if the areas available to him were unlimited, and as if these were infinite reservoirs of air, soil, water, and other resources. He could do this with relative impunity in the past because there was always some other place where he could go, start a new life, and engage in any kind of adventure that he chose.

Since the evolutionary and historical experiences of man are woven in his mental fabric he naturally finds it difficult *not* to behave as a nomad and hunter. It is not natural for him to rest quietly in a corner of the earth and husband it carefully. His thoughtlessness in provoking ecological situations that are potentially dangerous originates partly from the fact that he has not yet learned to live within the constraints of his spaceship.

The ecological attitude is so unfamiliar, even to many scientists, that it is often taken to imply acceptance of a completely static system. Students of human sociology have expressed concern lest the ecologist's professional interest in the well-balanced smoothly-functioning, steady-state ecosystem of the pond be extrapolated uncritically to the whole earth and its human population. They are right in emphasizing that man's relation to his total environment cannot be regarded as a steady-state ecosystem because this would imply that the human adventure has come to an end.

The physical forces of the environment are forever changing, slowly but inexorably. Furthermore, all forms of life including human life are continuously evolving and thereby making their own contribution to environmental changes. Finally it seems to be one of man's fundamental needs to search endlessly for new environments and for new adventures. There is no possibility therefore of maintaining a *status quo*.

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The challenge of the urban landscape

Even if we had enough learning and wisdom to achieve at any given time a harmonious state of ecological equilibrium between mankind and the other components of the spaceship Earth, it would be a dynamic equilibrium, and this would be compatible with man's continuing development.

The important question is whether the interplay between man and his natural and social surroundings will be controlled by blind forces as seems to be the case for most if not all animal species, or whether it can be guided by deliberate, rational judgements.

Admittedly, all of man's biological evolution so far and much of his history have been the result of accidents or blind choices. Many deliberate actions have had consequences that had not been foreseen and often proved to be unfortunate. In fact, most of the environmental problems which now plague technological civilization derive from discoveries and decisions made to solve other problems and to enlarge human life.

The internal combustion engine, synthetic detergents, durable pesticides and medicinal drugs, were introduced with a useful purpose in mind, but some of their side effects have been calamitous. Efficient methods of printing have made good books available at low prices, but are cluttering mail boxes with despicable publications and useless advertisements; these burden waste baskets with mountains of refuse which must be burned and thus pollute the air.

WASTE disposal is becoming as critical as resource production. It is obvious, from the law of the conservation of matter, that waste is produced exactly in the amount that resources are used. What is not so obvious is that, in the long run, the reverse must also be true: resource production depends upon the utilization of waste. Otherwise man will convert the biosphere into a global dump.

Waste that nature cannot process accumulates and pollutes the environment. Converting such waste into a usable form not only solves a problem of pollution, but also contributes positively to environmental quality and the production of future resources.

Like animal life, human life is affected by evolutionary forces that blindly fit the organism to its environments. Human history, however, involves also the unfolding of visionary imaginings. Creating a desirable future demands more than foresight; it requires vision.

The 18th century philosophers of the Enlightenment had imagined new ways of life long before there was any factual basis for their vision. They prepared the blueprint for most of what is new and desirable in modern societies on the faith that objective knowledge, scientific technology, and social reforms, could some day liberate human beings from fear and destitution. Throughout human history, progress has been a movement toward imagined utopian goals; the realization of these aims has in turn inspired new goals.

Mankind's greatest achievements are the products of vision. One need think only of the marvellous parks, gardens, and monuments that have survived from all great civilizations to realize the creative force of a long-range view in shaping desirable humanized environments.

The great parks and gardens all over the world originated from that extraordinary sense which is peculiar to man, the imaginary vision of things to come. For example, several books by European landscape architects of the eighteenth century show drawings of parks as they appeared at the time of their creation, with the naked banks of newly-created brooks and lakes, among puny trees and shrubs.

In these drawings, the landscapes have an abstract and cold elegance, but lack substance or atmosphere. One has to assume that the landscape architects had composed the expanses of water, lawns, and flowers to fit the silhouettes of trees and the masses of shrubbery not as these components of the landscape existed when first organized but as they were to become with the passage of time.

The architects had visualized the future appearance of their intellectual imaginings and planned their actual designs and plantings so as to give scope to the creative effects of natural forces. Similar visionary anticipations account for most of the great urban sites and vistas throughout the world.

While the great gardens, parks, and urban vistas created by past civilization still delight our senses and minds, other kinds of landscapes must be conceived to meet present and future needs. The old country roads, lined with stately trees, provided poetic and practical shelter for the man on foot or horseback and for slow-moving coaches.

A modern highway, however, must be designed in such a manner that horizons, curves, trees and other objects of view are related to the physiological needs and limitations of motorists moving at high speed. The evolution from parkways and super highways involves aesthetic factors based on physiological imperatives, as much as economic and technologic considerations.

Envisioning an environment satisfying the needs of an immense technological society is of course vastly more complicated than visualizing the future appearance of a park or designing a super highway. But certain principles hold true for all environmental planning, because they are based on the unchangeable and universal aspects of man's nature.

ON the one hand, the genetic endowment of *Homo sapiens* has changed only in minor details since the Stone Age, and there is no chance that it can be significantly, usefully, or safely modified in the foreseeable future. This genetic permanency defines the human race, and determines the physiological limits beyond which human life cannot be safely altered by social and technological innovations. In the final analysis, the frontiers of cultural and technological development are determined by man's own biological frontiers and therefore by the genetic constitution he acquired during the evolutionary past.

On the other hand, mankind has a large reserve of potentialities that become expressed only to the extent that circumstances are favourable. The physical surroundings condition not only the biological aspects of phenotypic expressions but also their mental aspects. Environmental planning can thus play a key rôle in enabling human beings to realize their potentialities. One can take it for granted that there is a better chance to convert these potentialities into actual realizations when the physical environment is sufficiently diversified to provide a variety of stimulating experiences and opportunities, especially for the young.

Any change in mental attitude and in ways of life becomes incorporated in the human group concerned through socio-cultural mechanisms, and from then on it conditions the future development of the group. Socio-cultural evolution is as much under the influence of the environment as is biological evolution, and almost as irreversible.

Planning for the future demands an ecological attitude based on the assumption that man will continuously bring about evolutionary changes through his creative potentialities. The constant interaction between man and environment inevitably implies continuous alterations of both—alterations that should always remain within the constraints imposed by the laws of Nature and by the unchangeable biological and mental characteristics of man's nature.

Photo © Hunting Aerosurveys Ltd., London

All that remains of Nimrud (in modern Iraq), one of the ancient cities of the Assyrian Empire, built on the Tigris River, are the skeletal forms of its once noble palaces and temples, hidden by the drifting sands. Erosion and progressive salinization ravaged great areas of Mesopotamia, where for thousands of years successive civilizations had maintained the soil with highly-developed irrigation. The famous historian, Arnold Toynbee, uses the Tigris-Euphrates basin as an example to support the belief that loss of command over the environment is the determining factor in the breakdown of civilizations.

Photo USIS

Modern technological developments give man the means to increasingly influence and even control his environment. Already, architects and town planners in Sweden, U.S.S.R. and U.S.A. have put forward ideas for enclosing cities in enormous transparent domes which would permit total control of the climate. Left, a project by the American architect, R. Buckminster Fuller for the "partial enclosure of Manhattan Island", shows mid-town New York encompassed by an aluminium dome.

For many years there has been a growing awareness everywhere of the need to create national parks for the conservation of wildlife. As long ago as 1872, the United States created the world's first national park at Yellowstone, Colorado (3,400 square miles). In 1885 Canada followed by establishing Banff National Park, and the movement spread to Europe, Asia and Africa. East Africa has now become a world proving ground for modern conservation practices. This polar bear paradise on the island of Wrangel, in the Arctic, is one of the U.S.S.R.'s national parks and reservations, which cover 63,000 square kilometres (the total area of Belgium and the Netherlands).

A BIOLOGIST LOOKS AT THE ANIMAL WORLD (BEASTS AND MEN)

by Jean Dorst

Photo © Izvestia, Moscow

MAN'S relationship with nature has consisted to a great extent in the irrevocable destruction of habitats, plants and animals without benefit to mankind in the long run.

The time has now come to take stock of the situation and to look ahead, for we have unquestionably arrived at a crucial point in our history.

It has taken at least several tens of thousands of years for the world to reach its present human population; yet in only 35 years from now the earth's population will have doubled. There are thus more consumers, and also many more "workers" to change the face of the earth, and the latter have at their disposal vast sources of energy as well as far more powerful tools than their predecessors ever had.

This accounts for the depressing balance sheet of the present epoch, all the more dismal because our attitude toward nature has scarcely altered from that of our ancestors': from many points of view we have remained at the stage of predatory economics—what German economists call "Raubwirtschaft". We are still trying to apply theories devised centuries ago. We still believe in the myth of nature's inexhaustible wealth and in a few "formulas" for turning it into fields, forests and artificial pasturage everywhere on the face of the earth.

Throughout previous centuries certain species of animals have vanished or become rare. The Migrating Pigeon, the Great Auk, the Carolina Parakeet, the Quagga Zebra, the Blue Antelope and several species of marsupials are the best known victims in this lamentable necrology. Destined to become tomorrow's fossils, many others are still holding out with their numbers drastically reduced, vestiges of formerly flourishing populations.

Nature conservationists, it is true, have taken positive steps to safeguard shrinking animal populations. Laws protecting some species and regulating the hunting of others have been passed, and national parks and reserves now exist in most countries.

But such measures no longer meet the situation, for the problem has taken on far greater scope and importance. Naturally, everything possible should be done to save the last vestiges of wildlife. But the major problem is to safeguard natural resources throughout the world and provide mankind with the means of survival.

It is undeniable that the earth is still being pillaged despite the efforts of biologists and considerable technical progress in agriculture, sylviculture, fishing and harvesting techniques. On the whole, "renewable" resources are steadily decreasing, despite some spectacular progress in specialized fields.

The situation is particularly serious in the developing tropical countries where soils are still being ruined by unsuitable methods of farming. In the Indus Valley the population increases at the rate of 10 mouths to feed every 5 minutes, but in the same span of time one acre of land is lost through erosion accelerated by man's misuse.

Throughout the world, natural forests are receding. Fish stocks, one of man's vital food resources, are being depleted by overfishing. Whales are disappearing at a catastrophic rate from their last refuge in the Antarctic oceans.

Naturalists understandably fear that

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JEAN DORST, *professor at the zoological laboratory of the Museum of Natural History in Paris, is president of the Survival Commission of the International Union for Conservation of Nature and Natural Resources (IUCN), and president of the Charles Darwin Foundation, created in 1959 by Unesco and the government of Ecuador to study the extraordinary wildlife of the Galapagos Islands. A prolific author, his major work is "Avant Que Nature Meure" (édition Delachaux et Niestlé, Neuchâtel, Switzerland, 1964), a remarkable and detailed study of the relationship between man and nature, which appears in English this month under the title "Before Nature Dies" (Collins, London).*

Bank-book for animals, trees and plants

the flora and fauna which make up natural communities will become rare or even extinct. But the world at large might well have to face the disquieting prospect of losing its renewable resources ever more rapidly at a time when the number of consumers is increasing, and individual needs are greater because of welcome improvements in standards of living.

A complete reappraisal should thus be made of the whole problem of man's relationship to nature. Despite technological progress and today's widespread belief in a machine-dominated civilization, man continues to be closely dependent on natural resources and especially on nature's primary productivity, of which photosynthesis is the first step. This basic fact links man closely to the entire living world.

Man himself is a single cog, although a vital one, in a complex mechanism composed of many working parts. Dwarfing the individual human being, whole populations and even the multitude of species making up the plant and animal kingdoms, is a vastly greater entity—the living organism that forms the entire "biosphere" of our planet, that is, the thin layer on which life exists on the outer surface of the globe.

Ecology—the science of relationships between living beings themselves and between them and their physical environment—teaches us that biological communities—the entire complex of various plant and animal populations, occupying specific habitats—have their own distinct ways of life and are subject to rigid laws that determine their evolution.

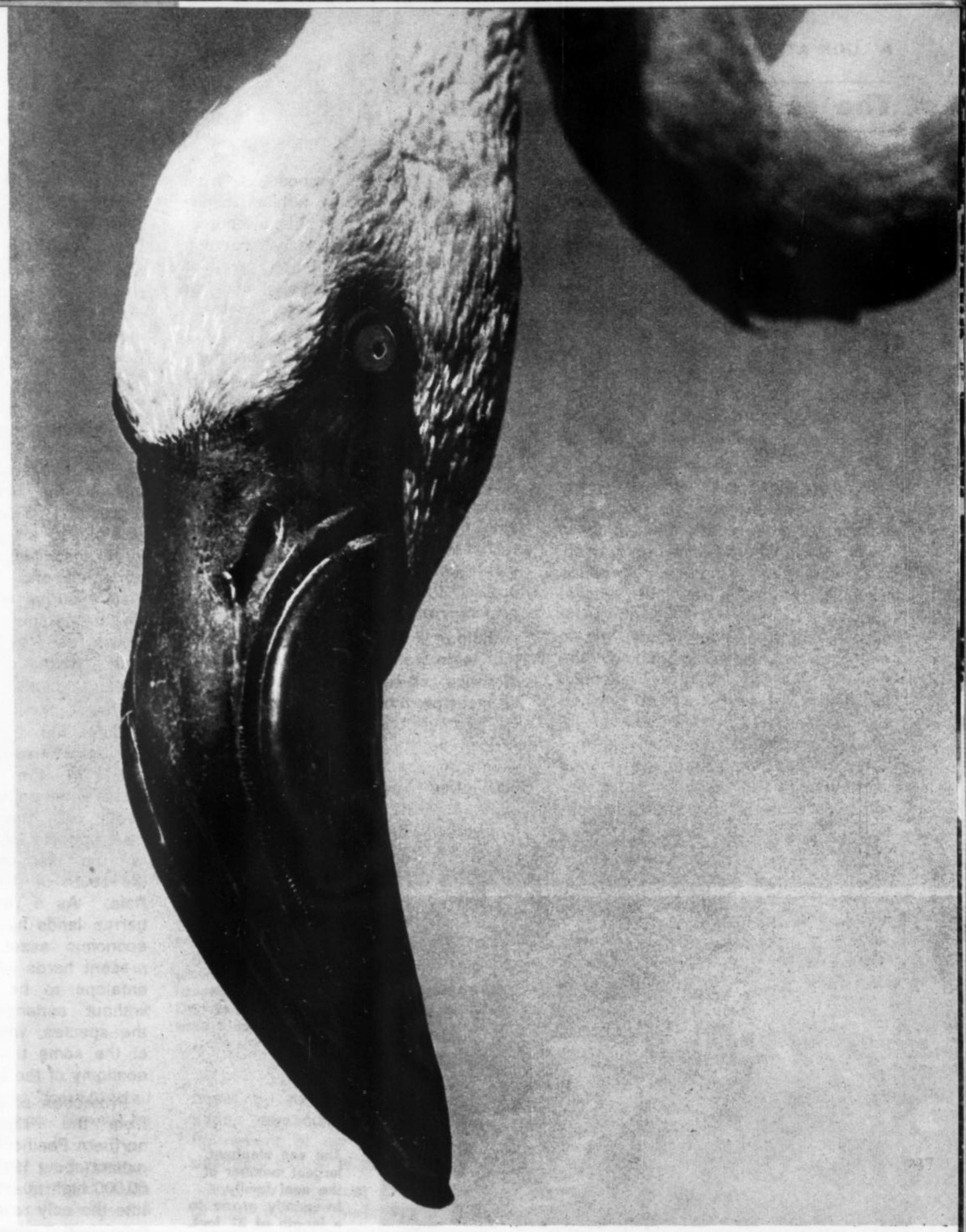
We must become one with this vast natural complex. Up to the present time our activities have all been aimed at destroying or at least reducing the size of natural habitats by channeling their production in terms of strictly human needs. In place of the multitude of species found in natural forests we have substituted one-crop fields. The long-term overall balance sheet very often shows a deficit, except on the most fortunate lands, which are restricted in area.

Obviously man can be only one of the elements in our planet's biological equilibrium. In its virgin state the earth is not favourable to the growth of our species. To satisfy our legitimate needs we have to "manhandle" nature and radically transform certain environments so as to increase the proportion of productivity of immediate use to man. We shall never again be in a position to do without fields and man-made prairies.

This does not mean, however, that we should apply the same "formula" indiscriminately: i.e. eliminate wildlife and change the face of the whole earth for our immediate benefit. This would cause the irrevocable disappearance of wildlife, but above all, would lead to serious disturbances in the overall productivity of the whole biosphere.

Use of natural resources and nature conservation are two sides of the same problem which is the quest for maximum return from the biosphere for man's well-being. Even if we are only concerned with the utilitarian factor, we are forced to admit that man has nothing to gain by exterminating animals and plants, even those which at first glance are either "useless" or seem harmful.

The pursuit of optimum equilibrium leads logically to the idea of planetary "management" according to a plan which takes into account the particular use to which different types of land are destined by their nature and the environment's varying physical and biotic features. We should, in particular, create integral natural reserves, within which every human activity



The strange bill of this flamingo is adapted for straining algae and tiny organisms from the water. A graceful bird, nearly 5 feet in height, the Lesser Flamingo as it is called, lives along the banks of lakes and rivers in many parts of the world. It is now strictly protected in the wildlife sanctuaries of the Camargue region of southern France.

A caterpillar (left) rests on a twig after a meal. The real head of this oleander hawkmoth caterpillar is curled under and what appears to be its eye is in fact a false eye mark on its body. As a caterpillar it feeds on and destroys foliage. But as a moth it will play an important role in the ecological cycle, by pollinating flowers on which it alights.

Photos © from "Nature's Paradise" by Jen and Des Bartlett, published by Collins, London, 1967

likely to alter or disturb the habitats is forbidden.

Such reserves afford protection for the flora and fauna closely linked with a specific habitat, which is the case of most species of small stature which have clearly defined needs. This also enables us to conserve animal and plant life for which man may find use in the future—nature's possibilities are indeed far from being exhausted. If need be, we would be able to draw on the reserves in these "banks", as has already been done with plants, trees in particular.

These integral natural reserves are not only conservatories but also natural laboratories for long-term research removed from any kind of human interference. Such basic work in pure research is essential to applied science if new techniques and procedures of resource-use, truly adapted to local conditions, are to be devised.

At the other end of the scale from these integral natural reserves are the areas suitable for development by man. Man obviously needs to cultivate a large proportion of the earth's surface. Only by creating artificial environments can he gain high yields from the crops he grows. But we must always bear in mind that agriculture is the conversion of our natural capital, particularly the soil.

It follows that only land clearly destined for agricultural purposes should be cultivated. Marginal land, subject to irrevocable and rapid deterioration from the moment that the natural habitat is altered, should be set aside. It is an ecological absurdity to plunder this type of soil as well as imprudence on man's part, for in so doing he risks losing future benefits from certain environments that his present knowledge still prevents him from putting to use.

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The sad fate of the fur seal

The only way to integrate this marginal land into the human economy is to use its natural resources within reason while maintaining its equilibrium relatively undisturbed. Perhaps in the future, new technical devices will enable man to draw immediate benefits from such land, but to transform it at present would be to put oneself in the position of a financier who squanders his capital for a quick profit instead of investing it for greater gains in the future.

It is in these areas that the aims of the nature protector and the economist are most clearly seen to be in harmony. Indeed, when properly used, this land can immediately produce sizeable returns. The first rational use to be made of it is obviously to maintain extensive forests, whose existence is amply justified by the modern world's increasing demand for timber. Forests, whose planned exploitation began many years ago, effectively protect the soil, particularly on the water-drainage slopes in mountainous regions.

Controlled and reasonable exploitation of wildlife by hunting is also advisable, despite opposition from certain nature conservationists inspired by a commendable but now somewhat outdated sentimentality. Hunting matched to the population level of game animals is a rational use of this livestock and even increases its productivity.

In North America, for instance, duck populations are now systematically worked over on the basis of constant studies that reveal the birds' numerical importance and distribution. The lakes and marshes where these birds reproduce, like every wetland habitat in the world, are endangered by drainage and reclamation projects. But their food yield as game reserves helps to protect them from the development projects of the technocrats.

Biologists have recently discovered that large mammals, particularly those of Africa can be utilized systematically as meat providers, an important asset in protein-poor tropical countries. African savannas can sustain a liveweight of gazelles, antelopes, buffaloes and other vegetarian mammals far superior to the domesticated livestock man might be tempted to substitute for them (see "Unesco Courier", September 1961, "Africa's Wildlife in Peril").

The biomass (the total weight of any given animal species) of wild ungulates (hoofed animals) can reach nearly 40 tons per square kilometre in the grass savannas of the Congo and Uganda, whereas the same habitat can maintain only 5½ tons of livestock per square kilometre.

Moreover, though far greater in number, wild animals do not deplete the soil because they pasture in a manner far better adapted to its regrowth. This factor makes it feasible to slaughter a given quantity of gazelles, antelopes, and even buffaloes and elephants, for meat, thus ensuring sufficient returns from these marginal areas—unfit for any direct use by man—to guarantee their protection against untimely transformations.

The rational putting to use of wildlife has produced encouraging results wherever it has been tried out. In the Soviet Union, the Saiga antelope, which became so rare about 1920 that it was believed to have become extinct, is now protected on the steppes that stretch from the south of the U.S.S.R. to Central Asia. As a result, these otherwise barren lands have become a positive economic asset. The size of the present herds allows 300,000 head of antelope to be cropped each year, without endangering the future of the species, which is protected, but at the same time integrated into the economy of the Soviet Union.

Protection of the Alaskan fur seal, from the Pribiloff Islands in the northern Pacific, which became almost extinct about 1911, now yields annually 60,000 high quality skins which constitute the only resource of these underprivileged isles. This promising achievement is in striking contrast to the situation in the Austral Islands and Juan Fernandez and Galapagos Islands where the fur seal has been slaughtered to the point where, in its present numbers, it is unlikely to be able to re-establish itself. By squandering this natural capital man has short-sightedly killed the goose that laid the golden egg.

Such examples demonstrate that we now have sufficient know-how and tested techniques to discard once and for all the naïve notion that the face of the earth must be completely transformed, and that only the relatively

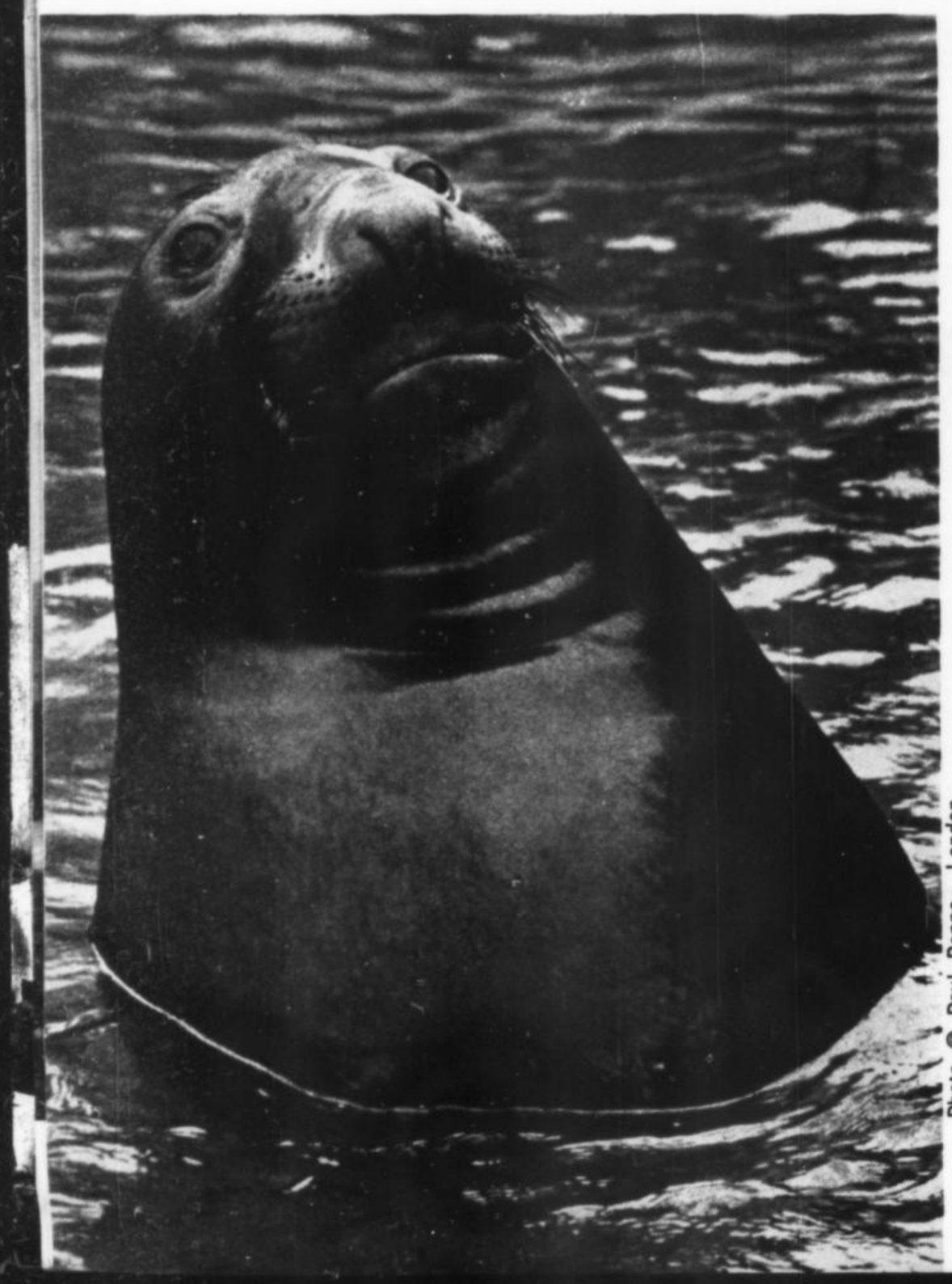


Photo © Paul Popper, London

The sea elephant, largest member of the seal family, frequently grows to a length of 21 feet. A native of the southern Pacific coasts, particularly the Kerguelen Islands, it has been hunted almost to extermination for its oil.

Photo © Christian Zuber - Rapho

"... That strangest anomaly of outlandish nature," wrote American novelist Herman Melville, of the iguana after visiting the Galapagos Islands in 1841. A living fossil, survivor of the great saurians, which once roamed the earth, this awesome-looking reptile is completely inoffensive. It has survived until our time in the isolation of the Galapagos archipelago, where Charles Darwin conceived the theory of evolution. It is at Galapagos, a unique repository of nature, with its extraordinary flora and fauna, that Unesco created the Charles Darwin Foundation in 1959 in co-operation with the government of Ecuador. Here, three wide-eyed iguanas seem to be posing for a family portrait.

few animals and plants domesticated thousands of years ago should be utilized for our benefit.

Instead of destroying wild habitats and replacing them by artificial fields and pasture land, we can manage the entire earth complex. This implies preserving the earth's diversity and respecting the natural use of each acre.

Instead of universally applying the same formula, we should maintain a balance between the different kinds of habitats. Forests, marshlands and wild expanses should be included along with fields and pasture land in a single mosaic, taking into account climate, type of soil, flora and fauna. Such a balanced totality will certainly guarantee a far better long-term output than hasty transformations.

Such sensible management would also help to protect man's living space. The problem of the human habitat has now become a crucial one in a world beset by rapidly increasing populations, tentacular towns and disfigurement of so many localities by unsightly industrial plants.

We are only just becoming aware of the social, medical and psychological factors involved in this problem, but already they are revealing the extent to which nature conservation and management are closely linked with the protection of man himself.

There is room for optimism because man, having now become aware of the dangers, is weighing the consequences. He has realized that nature conservation is not solely the domain of a few biologists preoccupied with protecting some rare species of animals, but is in fact the far greater problem of the rational use of mankind's natural capital and living space. A well-planned management policy can still safeguard this capital while substantially increasing the income from it to meet man's legitimate needs.

Such management is primarily the business of governments and appropriate authorities. It also is the concern of the major international organizations: the United Nations and particularly Unesco and FAO, have clearly shown that they are deeply concerned with the problems posed by the management of nature and its utilization on rational lines.

Nature conservation, no longer the business of a handful of devoted naturalists, is thus entering a dynamic phase. This renewed vigour and the research programmes being set up on an unprecedented scale are a sure guarantee that our natural capital will be safeguarded.

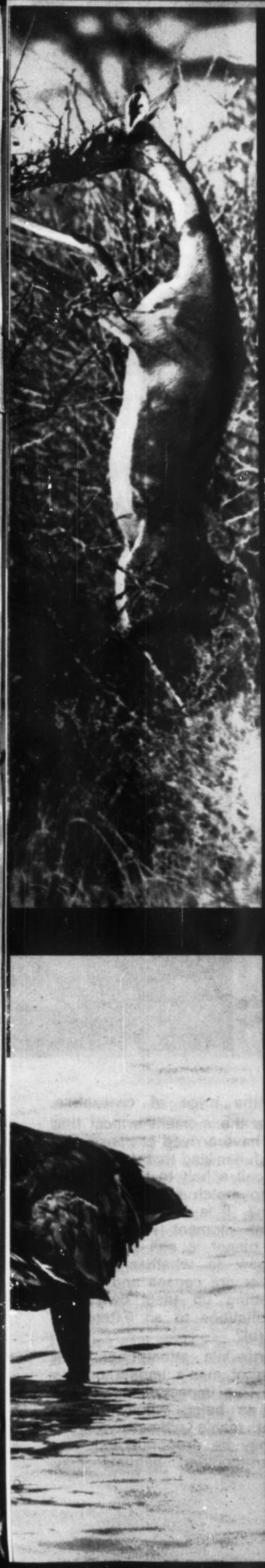
Though the present situation is serious, mankind possesses the means of solving these vital problems. In this effort it is up to each of us to engage his heart as well as his mind.

A spectacle of grace and equilibrium, two female gerenuk antelopes stand on their hind legs to feed on opposite sides of a bush. An inhabitant of Africa, and particularly Somaliland, the gerenuk is also known as the giraffe-necked gazelle, from the length of its neck. Gerenuk never need to drink water, and live far from lakes and rivers. Only the males carry horns, which are delicately curved.

From nature's paradise

Tug of war over a fish between two goliath herons of Tropical Africa. This bird is the world's largest species of heron.

A partly submerged hippopotamus makes a perfect landing strip and fishing platform for many species of waterbirds. Cormorants, grey herons and other birds with a taste for frogs often alight on the backs of hippos, sleepily indifferent to these intruders. An easy prey for hunters, the African hippopotamus is dwindling in number.



Photos © from "Nature's Paradise" by Jen and Des Bartlett, published by Collins, London, 1967

By the start of the 21st century, it is estimated that some three-quarters of the world's population will be living in cities, which in many cases will have become vast conurbations that have exploded from their present confines and have bitten deep into the countryside. Big modern cities are already plagued by air, water and noise pollution, which will pose even more challenging problems in the cities of tomorrow. Photo right shows haze and smoke on New York's Manhattan Island rising almost as high as its skyscrapers.

Photo © Andreas Feininger

MAN AGAINST NATURE

by Frank Fraser Darling

The havoc wrought by modern man and civilization against nature is graphically described in the four articles that follow, based on a study by Prof. F. Fraser Darling, with comments and additions by Vladimir Sokolov, of the U.S.S.R. Academy of Sciences; Dr. François Bourlière (France), president of the International Union for Conservation of Nature and Natural Resources; Frederick Smith, professor of zoology, University of Michigan (U.S.A.); and specialists from Unesco and FAO. This far-reaching study was one of the important papers submitted to the Unesco "Man and the Biosphere" conference last autumn.

THE world as it existed before man used tools and fire was one of immense riches of natural resources, organic and inorganic. But to say that is to put the cart before the horse; natural resources were not resources at all until man was both present and able to make use of them.

For a long time man may not have been much else than the equivalent of an indigenous animal of limited change-producing activity, but even at the advent of that great thrust, the Neolithic Revolution, hunting and food-gathering man had changed parts of his world more or less unintentionally by the use of fire.

Men were so few and the world apparently so large that it would have been strange had man dwelt philosophically on his own numbers and the fate of natural riches. The student of the human condition, albeit he may hold to the philosophy of conservation, accepts the loss of much natural wealth as the price of civilization.

When was the moment critical that man should have arrived at consciousness of that fuller kind that would have led him to call a halt to bald exploitation, and to match exploitation with rehabilitation? It is possible we have reached that moment now, though overall the planet is still losing out. The fear now is whether we *can* rehabilitate, or are causes and consequences setting up their own percussive oscillations to an extent we cannot control?

It is worthwhile attempting some classification of man's impact on the biosphere. This impact is not to be thought of as being wholly to the detriment of man's ultimate welfare though it may be preponderantly so. Certain man-modified habitats may

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represent ecosystems of equal or greater production and wealth-building power than the natural condition.

Fire has been used for animal hunting, destroying forest incidentally and preventing much regeneration. But production of savannas as in parts of Africa with a rich spectrum of ungulate species (hoofed animals), may lead to a rich habitat for organic production.

However, savannas of Brazil and Guiana seem definitely to lose out as to their qualitative potential. Is this because of a limited array of ungulates as compared with Africa? Again, in North America, the Indians extended the prairie range of bison by burning forest and the resulting humid prairies were an immense store of rich soil.

Sometimes the terrain is also burned intentionally to produce fresh young grass; this leads to impoverishment of the array of plants present originally, which upsets flexibility of the grazing complex in face of seasonal climatic variation. Examples are production of stretches of grassland in the Scottish Highlands; and the gradual elimination of grass, giving way to gall acacia and lantana bush in parts of Africa, and mesquite in North America's southwest.

Settled cultivation, in opposition to shifting cultivation, leads to soil exhaustion if replenishment is not understood or is impossible, or possible aridity if active counterworks are not used. The English "breks" or broken lands are thought to have developed from Neolithic cultivation. The "Dust Bowl" of the United States in the 1930s showed what continuous extractive cultivation without adequate replenishment could do when a cycle of drought years was encountered.

Broadly, cultivation must manage to sustain the level of organic matter, or the soil either bakes or blows away. But many examples can be given where settled agriculture, under various ecological conditions, had been successfully carried out for centuries, namely in the Far East, the Near East, the Mediterranean area and Central America. The ancient Negev demonstrated efficacy of counterworks for conservation of water; abandonment of these resulted in almost complete degradation of the habitat.

Conservation-minded people, as a whole, tend to have an absolute antipathy towards shifting cultivation as being wholly deleterious to habitat.

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Ferdinand and the sheep

Instances could be given of this practice, however, that produce variety and valuable "edge-effects" so long as the human population is low.

The *chitemene* system in Central Africa is a good example: the gardens are not larger than an acre or so and being surrounded by bush on fairly level terrain soon return to bush after 3 to 5 years of use, and are not used for a further forty years. Immediately after being relinquished these gardens are taken over by colonies of *Tatera* rats while the soil is loose and friable. The rats, caught by small boys, form a secondary protein crop for a year or two. Following this, the bush slowly recovers and replenishes the soil.

Shifting cultivation is the bane of central and northern South America and land hunger, with rapidly increasing human population, creates a vicious circle from which it is difficult to break. Erosion is having long-term effects on far greater areas of country through interference with the water relations.

Irrigation has a long history and is still a popular line of development, but in large-scale irrigation projects, improvement or maintenance of soil fertility over a long period raises many problems. As they are so often sited in arid areas where a high evaporation rate has kept salts in the soil, irrigation tends to redissolve the salts and deposit them again as a crystal crust. Re-use of irrigation water from sources such as the Colorado River can mean good ground being made saline and useless at the lower levels of operation. This also happens on the Bear River, Utah, and on the great Sind scheme in Pakistan.

Wise irrigation, or possibly fortunate irrigation, uses rainwater, and if this is adequate in supply, it can wash the more saline ground of the arid parts where the water is used. The Gesira scheme in the Sudan is an excellent example. The country's economy has been much strengthened by non-saline water from the Blue Nile (which runs at a higher level than the White Nile) which is taken off and spread over the triangle of the Gesira. The used water drains into the White Nile on the lower side of the triangle, the volume of which renders insignificant any salinization suffered by the Blue Nile water passing across the Gezira.

ONCE domestication has occurred sedentarization limits movements of stock which often leads to over-grazing. Different species of domestic stock cunningly used in different climatic conditions make for maintenance of habitat, but well-understood balances can be easily upset by natural fluctuations of conditions.

The technique of successful grazing has to be learned and even when learned may not be generally followed.

Even the sophistication of a modern research station can fall short, as in the case of the reindeer era in Alaska, where deterioration outpaced research. As a result, grazing land deteriorated and reindeer herds diminished. Modern examples of extractive grazing, as in European Africa, parts of Australia and New Zealand, and the shortgrass prairies of North America, have caused rapid soil deterioration.

Nomadism of pastoral origin deserves special mention because it can be so easily upset or broken, to the detriment of the habitat. Nomadism is at best a pursuit of the steppe regions of the world and produces least deterioration. It is utterly bound up with movement if habitat is to be conserved. Any undue lingering punishes the vegetational complex, reduces its numbers of species and therefore impoverishes it.

The finest nomadic areas of the world were the *chernozem* plains, like those of the Kuban where the Scythians roamed in the time of Herodotus (see page 2). Nomads depended on animal products for sustenance and warmth, and as protein consumers were an ecological élite, at the top of the food chain or pyramid.

The *chernozem* soils of America and Europe have stood up well to the extractive agricultural methods imposed upon them, and it is likely that good farming methods will maintain them in the future. But a revolution of the plough of this kind always goes farther than those lands best able to bear it. Higher, poorer and more arid steppes have been "dry farmed" with disastrous results.

Wherever sedentary populations have impinged on nomad grazing there has been degradation of habitat for which the nomads are invariably blamed. Yet nomadism as a careful pastoral process is the least traumatic of human influences and as a form of husbandry utilizes areas which could not be utilized by man in any other way. It is essentially ecological in structure, relying on movement and

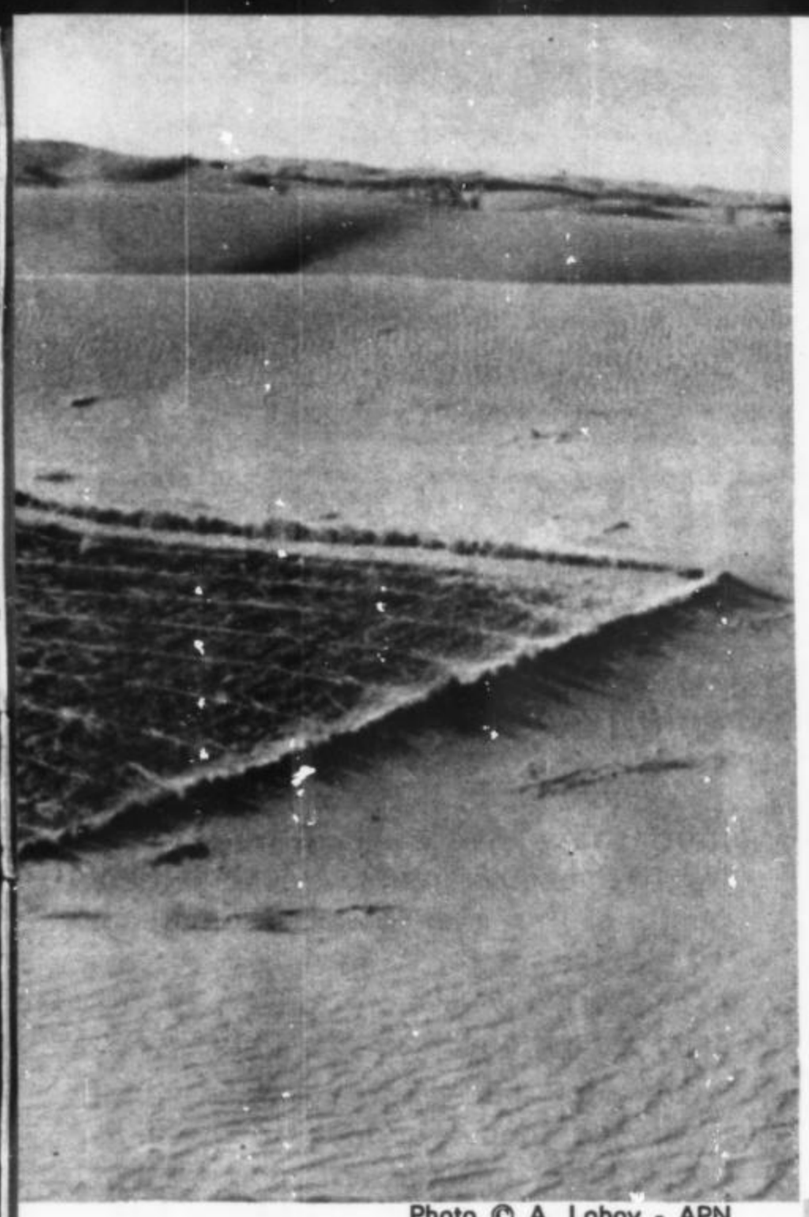

Photo © A. Lobov - APN

MAGIC CARPET IN THE SAND. Tenacious desert trees, whose roots can hold shifting sands, will soon flourish in this hollow (left) among the dunes of the Kara-Kum desert in the Soviet Turkmen Republic in Central Asia. The Repetek Desert Afforestation Centre uses the large cane mats seen here to hold the sand in place to give fast growing trees a firm start in life. When they have grown through the mat, the trees will anchor the sand.

seasonal use, a wide spectrum of grazing animals adapted to well-understood differences in habitat and producing much energy without loss of organic matter.

Nomadism is always brittle: apparently small changes reduce it to habitat spoliation. The Masai in East Africa are a Nilotic tribe moved from a humid homeland into high, dry steppe country. Yet their knowledge was good and accurate and they did not deteriorate their habitat until the white man brought veterinary magic which prevented the full incidence of mortality which formerly kept the herds to a proper level for the stock-carrying capacity of the ground.

The Masai and their country are a good example of integration of nomadism with the indigenous animal population. Wild game existed alongside domestic herds, tolerated and respected. In the Bahr-el-Ghazal, the Dinka accept giraffes as part of the herd.

Even in this paradise of symbiotic cattle culture, the march of modernity and the hungry mouths elsewhere are demanding rice culture.

History records a striking example of nomadism having become allied with political power and made so powerful by law that a whole country was devastated. This is what happened with the society of the Meseta in Spain. Ferdinand and Isabella allied themselves with it for the profit of the crown. The flocks of Merino sheep were driven through cultivated areas and it even became illegal to fence against them. It took the folk of Spain nearly 200 years to beat the Meseta, but the bare hills of Spain remain today.

The Masai, pastoral nomads of East Africa, are an outstanding example of a people who have learned to adapt their way of life to the environment, by co-operating with nature instead of despoiling it. With the introduction of Western veterinary techniques, however, grazing lands are now overstocked, and nature's delicate balance is threatened. Below, a Masai shepherd tends his flock of goats. For the Masai, a man's prestige is measured by the abundance and quality of his cattle, sheep or goats.

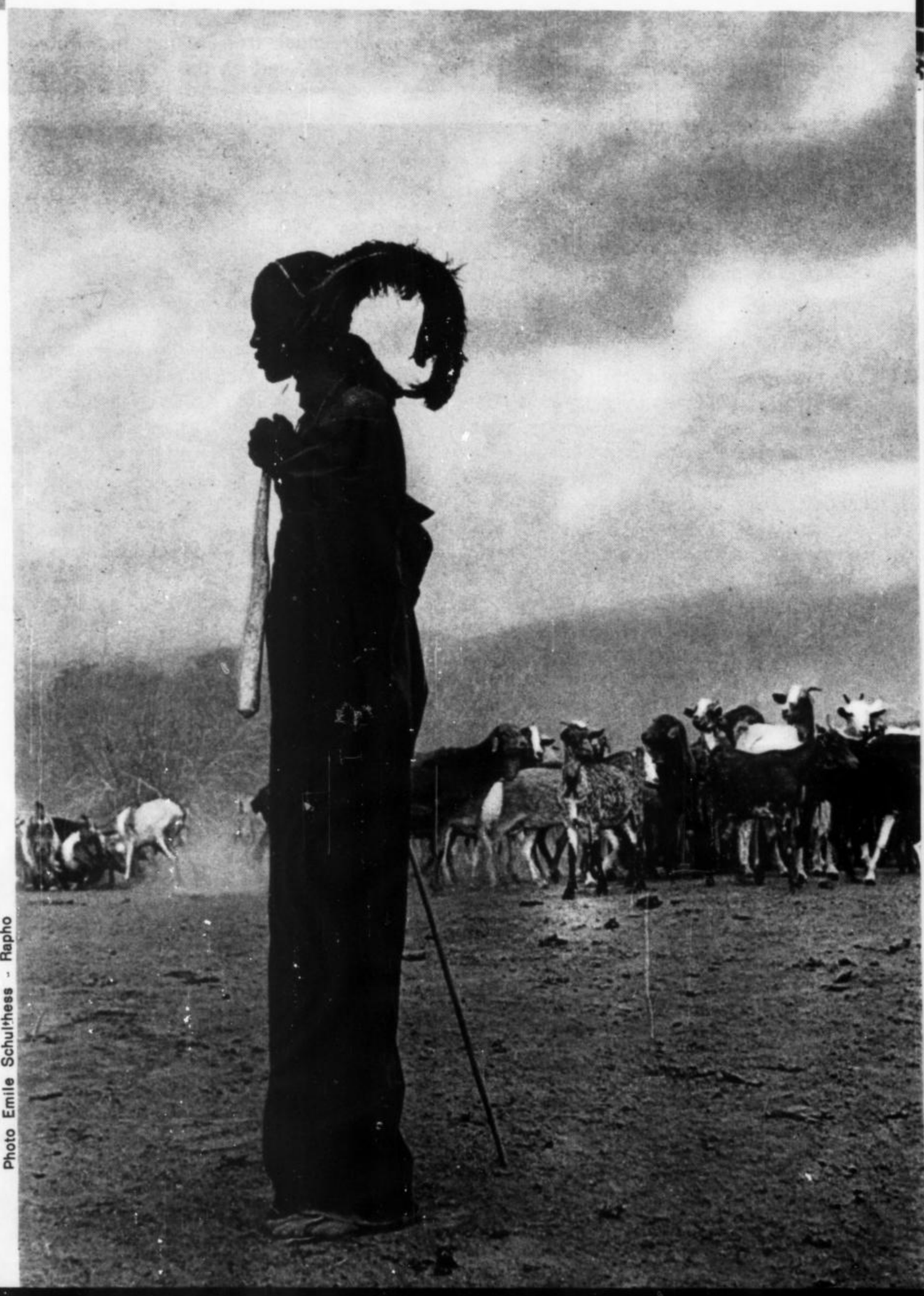

Photo Emile Schulthess - Rapho

Man against Nature - 2

THE DEAD LAND OF THE WITHERED TREES

DEFORESTATION has taken place from earliest times and is probably better documented than most other types of change of habitat. The earliest effect of restricted deforestation is one of enrichment of the habitat by providing change in a situation of little or no change. Parkland in forest is appreciated by many species of grazing animals.

Primitive and later man, utterly surrounded by forest, arrives at a psychological state eventually when he must push back the forest and not be enfolded.

The Anglo-Saxon colonizing a Britain which had islands of ploughland and pasture connected by roads in a sea of forest was not only knowledgeable in tools and woodwork, but clever ecologically. To create new arable ground in the long term he used a biological plough or grubber in the oak and beech forest in the shape of the snouts of herds of swine, descendants of the European wild boar. The beasts garnered the acorns and beech nuts, and by concentration of effort prevented regeneration.

As actual tree felling took place, grass followed on the "cultivation" by the pigs; grass parklands or lawns were created, to be ploughed as needed. In temperate, humid England, the changed biological system of forest to grassland with occasional trees made for little loss of organic matter and the output of free energy was probably not far behind that of the forest. Certainly it allowed more of it to be used for producing man's food.

The fact that the *export* of natural resources tends to open the way to devastation has been documented many times. The oak forests of England did not all fall to the axes of the early Anglo-Saxons. The rise

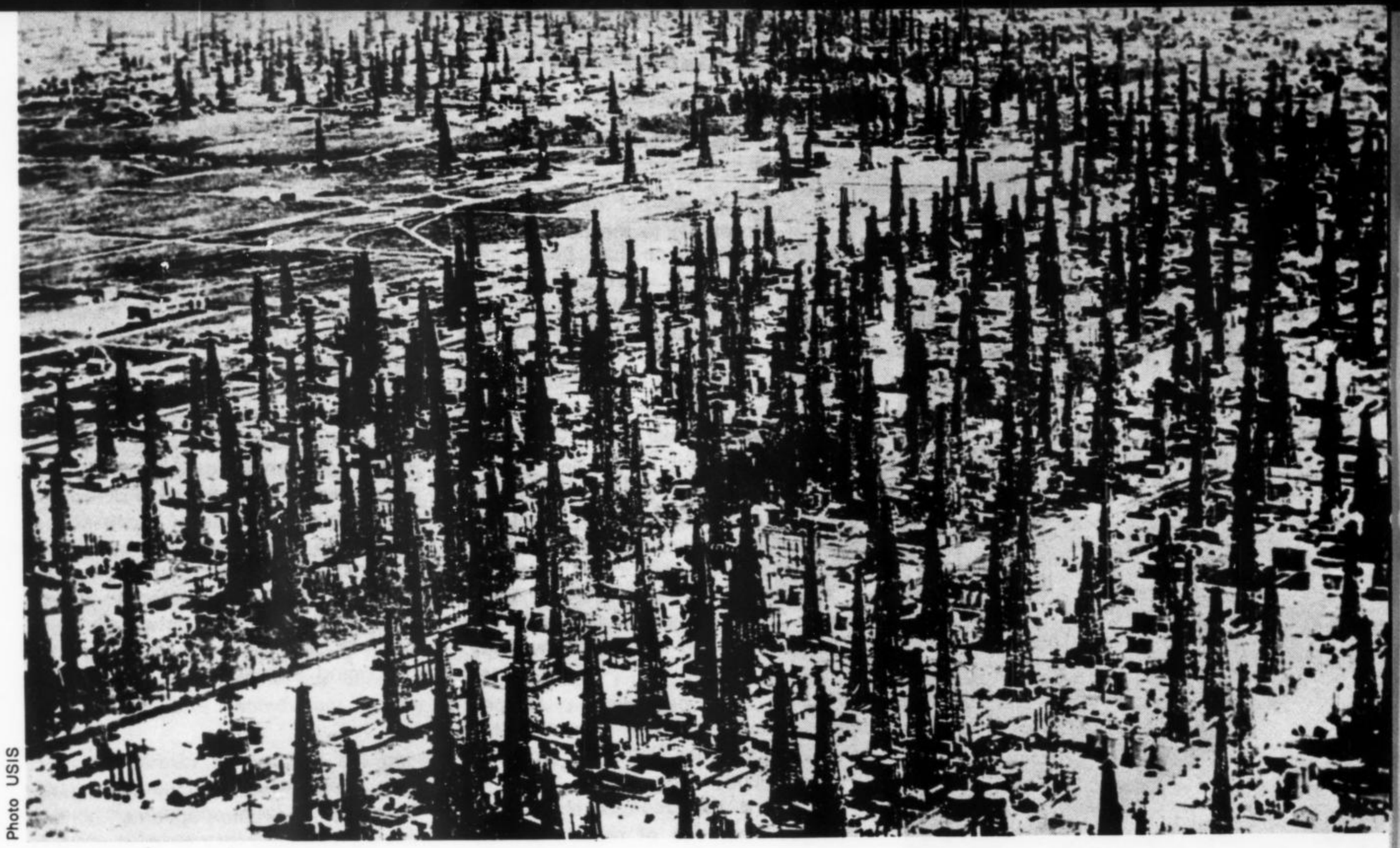

Photo USIS

Photo © Paul Almasy, Paris

MAN BEAUTIFIES NATURE... Stretching as far as the eye can see, this "mechanical forest" of oil derricks (above right) testifies to our capacity to create ugliness as we search for wealth. At left, a watery wasteland where once a rich forest canopy maintained the land and sheltered animals. It used to take millennia to deplete fertile land and forests; now modern man can accomplish this in a few decades.

of England as a naval power involved heavy felling, and the use of iron demanded more felling for smelting fuel.

The opening of the 17th century saw prohibitions on the felling of English timber. This drove the iron smelters to the woods of western Scotland where the long sea lochs allowed ships laden with iron ore to penetrate deep into the forests of Scots pine and to have access to the oaks down in the glens.

Here devastation came quickly because of the high rainfall, acid soils and steep slopes. The Forestry Commission of the present day is concerned with the repair of this damage, but at great cost because the active humus has long gone from the once-timbered slopes.

Perhaps the onslaught on North American forests was the main reason for the rise of conservation thinking. Fairfield Osborn said in 1948 of the United States, "The story of our nation in the last century as regards the use of forests, grasslands, wildlife and water sources is the most violent and destructive of any written in the long history of civilization. The velocity of events is unparalleled..."

This fact of weight and speed of destruction may find its absolution in the rise of the ideal and practice of conservation in the United States. Similarly in Africa, there has grown an awareness of the need to conserve, often as a result of destruction and denudation.

On a happier note, the African Special Project carried out jointly by the International Union for Conservation of Nature and Natural Resources and FAO, may well have been the turning point in attitudes towards conservation in the rest of Africa. No less important was the international conference held in Arusha, Tanganyika in 1961, on the need for conservation in tropical Africa.

The felling of tropical forests has been a story of sheer extraction. The massive and impressive accumulation of organic matter presented by this oldest life form on the planet tends to blind us to its fragility. Like most forest forms, the tropical is primarily a photosynthetic factory of cellulose, with any protein as very secondary production.

The tropical forest floor has been protected from the sun for thousands of years with the niches for decay and conversion so well filled that nutrition of the trees and the life of the canopy are bountiful. When the forest is felled the tender soil exposed to the sun oxidizes rapidly and disappears:

Like snow upon the desert's dusty face.

Lighting a little hour or two—is gone.

The mahogany forests of Hispaniola, the name by which Haiti was known after its discovery by Christopher Columbus, have gone; those of Honduras are going and the results are well known.

The world's wetlands are another habitat sometimes transformed by man. In general, wetlands are highly productive of protein in the shape of animal bodies—mammals, birds, fish

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The Big Bad Wolf—a psychological fiction

and invertebrates—but not always in a form acceptable to the human being as food. Drainage has been done throughout history in various parts of the world to create navigable channels and to provide more agricultural land or, perhaps, specially fertile agricultural land. Holland and the Fen country of England are good examples, as also are many areas in the U.S.A.

Where the soil is alkaline peat it becomes highly fertile when dry enough to manage, but so contracts in volume that diking and pumping become necessary, for the won land is then below the level of the adjoining sea. The situation is vulnerable and soil is friable and tends to blow away.

The question must always be whether the considerable capital works necessary can be maintained and whether the potential fertility of wetland soils can pay for them. Once more the ecosystem is being changed from one of protein production to one of largely carbohydrate grain production. Certainly more mouths can be fed on the "devaluated" product. The aesthetic loss of beautiful species, especially birds, from drainage in wetlands is considerable.

The United States has changed its former policy to some extent by allowing wetlands to refill and resume their former land form, for example the Klamath Marshes in northern California. It might be said here that allowing marshes to refill is only possible as a policy in a country affluent enough to be producing grain surpluses and where the proteinous wildlife is beginning to have extrinsic values for recreation.

The Everglades National Park in Florida provides a perfect instance of the complexity of wetland habitats and what can happen when water is deflected from these areas.

The Everglades constitutes a large national park, but is a vivid example of several thousand square miles being insufficient to be an ecologically independent area. Nothing is simple when playing with water on wetlands.

General reserve on changing the nature of wetlands is not yet apparent. There is a psychological fascination about playing with water and to change a protein-producing system to a carbohydrate-producing one seems to provide ample practical reason for going ahead.

Africa has many interior wetlands and one of the most promising lines of development in recent years has been improved management and enlarged use of the fish resources of these wetlands. Zambia is an excellent example of achievement of an improved standard of nutrition for a new industrial population from the freshwater fisheries of the numerous swamps.

Yet the projected increase in human population has caused serious consideration of draining such areas as the Kafue and Chambeshi Flats to serve as wheat-growing lands. Not only would fishing be constricted as a result, but the herds of game animals would go also, despite the fact that the red lechwe, an antelope moving in large herds, is adapted to grazing inundated lands and potentially capable of management as a meat-producing animal.

THE history of over-hunting selected desirable species is well known, and concerns us here in so far as the disappearance or decrease in numbers of species has altered the ecosystem and the habitat. We do not know very much about this; our knowledge of niche ("microhabitat") function is growing but we have much to learn about habitats from which a niche occupant has been removed.

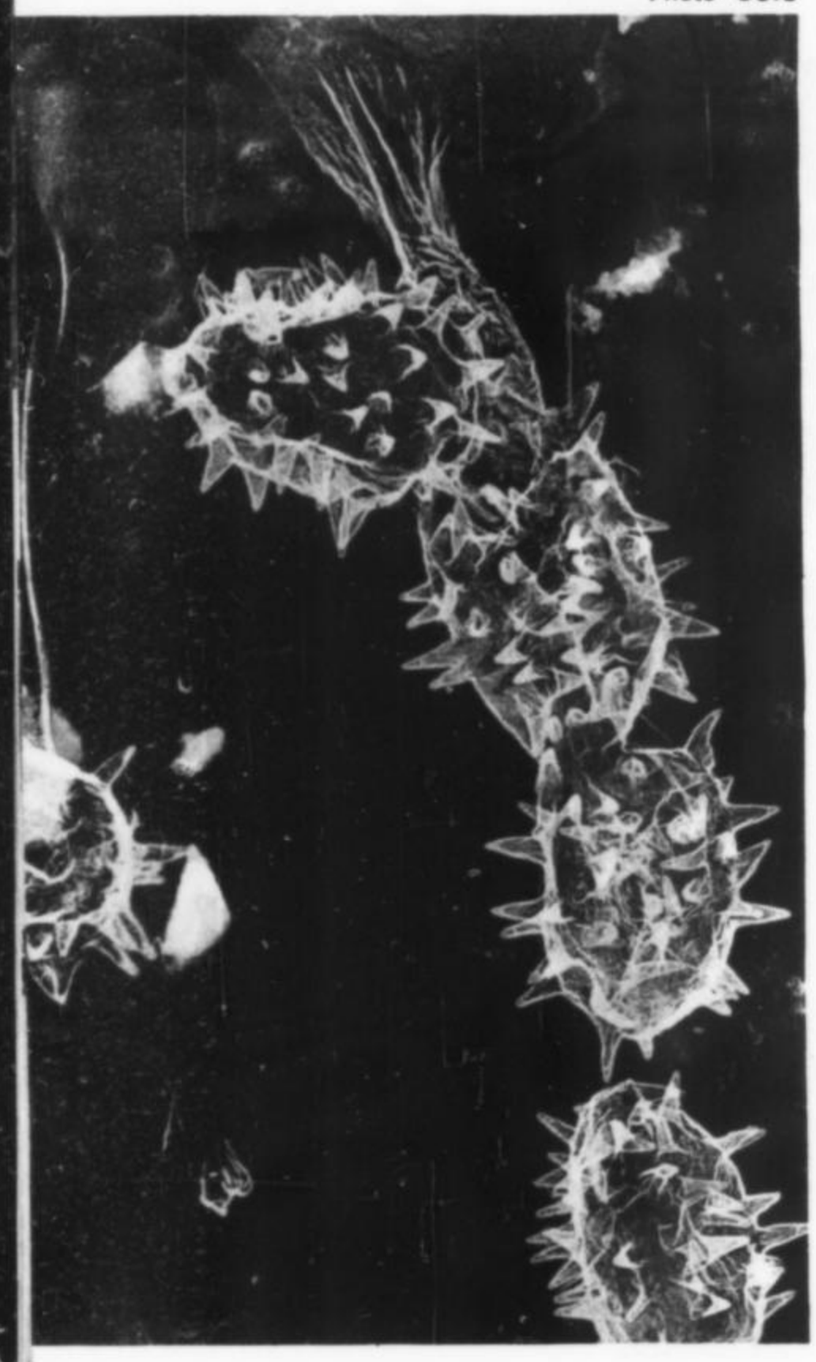
The elephant would provide a good comparative study because we have plenty of habitats from which it has recently been removed by over-hunting and others in which it is more numerous than ever because of protection. We have a fair notion of what is happening in the latter situation—production of grassland and removal of bush with the tsetse fly being pushed back. The elephant is the agent of change, but man's distortion of the elephant's way of life is the instigator of change.

Not enough thinking has been done about the influence of reduction of plains game on African savanna. The bison on North American prairies was followed by the plough, so we know little of the change which actual reduction would have caused, except that on the fringes of prairie there is a coincident rise of even-age forest.

The wolf is perhaps the best example of the intentional extincting or eradication of animal species because of its direct challenge to extended pastoralism. The supposed behaviour of the wolf has become a human psychological fiction which can still influence the fate of habitats.

In the recent past, bounties were still given on wolves killed in the Arctic

Photo USIS



A single crumb of soil is a teeming invisible community of infinitely tiny creatures—bacteria, protozoa, microscopic worms and mites—on whose health, to some extent, man depends for the successful raising of crops. This photo of a soil microbe has been magnified more than one million times. As an indication of its actual size, a human hair magnified a millionfold by an electron microscope would appear more than 150 feet in diameter.

where human predation of the caribou was quite insufficient to prune the caribou population to safeguard the range which, if over-grazed, might take a century to recover—longer than caribou could wait.

There were excellent object lessons in the reduced reindeer populations on the west coast of North America after thirty years of over-grazing of the ranges, but the psychological obsession about wolves had blinded people to the plain cause. These over-grazed ranges can still be seen as different from the surrounding terrain when viewed from an airplane at 20,000 feet.

How far the lack of the predator was responsible, or how far the sheer lowering of numbers of deer was the cause of the Kaibab plateau crash of mule deer in 1916 will probably never be known, but the fact of an absence of predators was immediately understood.

What interests us most is the percussive influence on habitat caused by violent fluctuations due to the man-caused absence of predator populations which not only lower the numbers of the herds on which they prey, but also keep them moving. Recent work on the moose-wolf ratio and equilibrium on Isle Royale in Lake Superior shows how a woodland habitat carrying these large deer can be maintained by man allowing the wolf to do all the necessary culling.

Mineral exploitation and industrial processing are other factors to be considered. Smelting liberates toxic fumes which kill plants and sometimes animals. The sterilization of areas by copper smelting in Tennessee is well known. Aluminium smelting at the foot of the Great Glen of Scotland produced fluoride fumes which were blown north-eastwards up the glen by the prevailing south-west winds. The grazings were affected and young cattle suffered. It took a court case and very dilatory action thereafter before scrubbers were installed to remove the hazard.

The lead mines of Derbyshire and the felspar workings left areas of spoil on which the herbage which grew thereafter was so far impregnated with lead that young stock could not be grazed on them. This effect remains in the ground even centuries after the mining.

Coal and shale mining not only create conditions where subsidence occurs, but large quantities of detritus are produced which are in general dumped on the surface near the mine shaft. These vast dumps not only make the landscape an unhappy one aesthetically, but serious interference with

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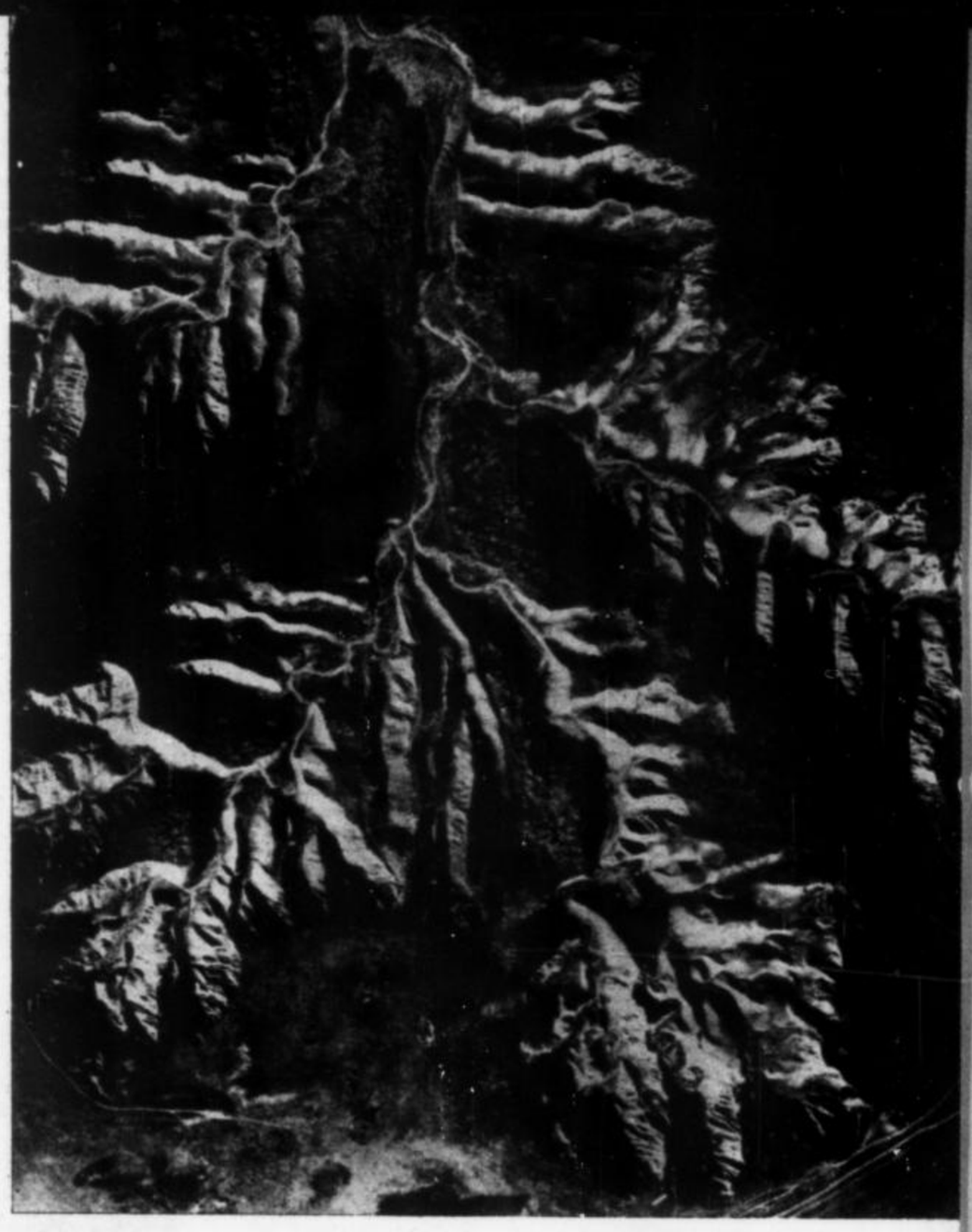
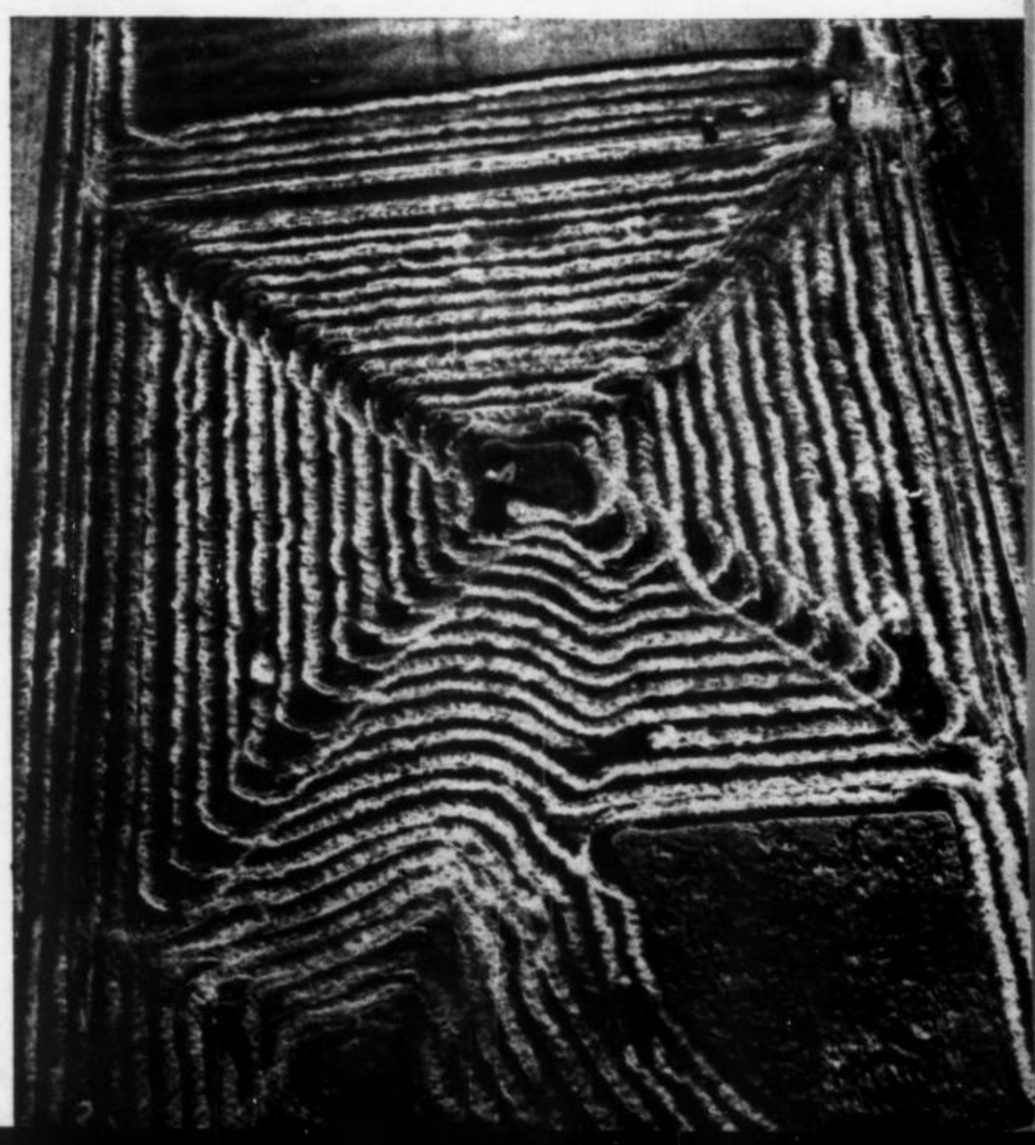
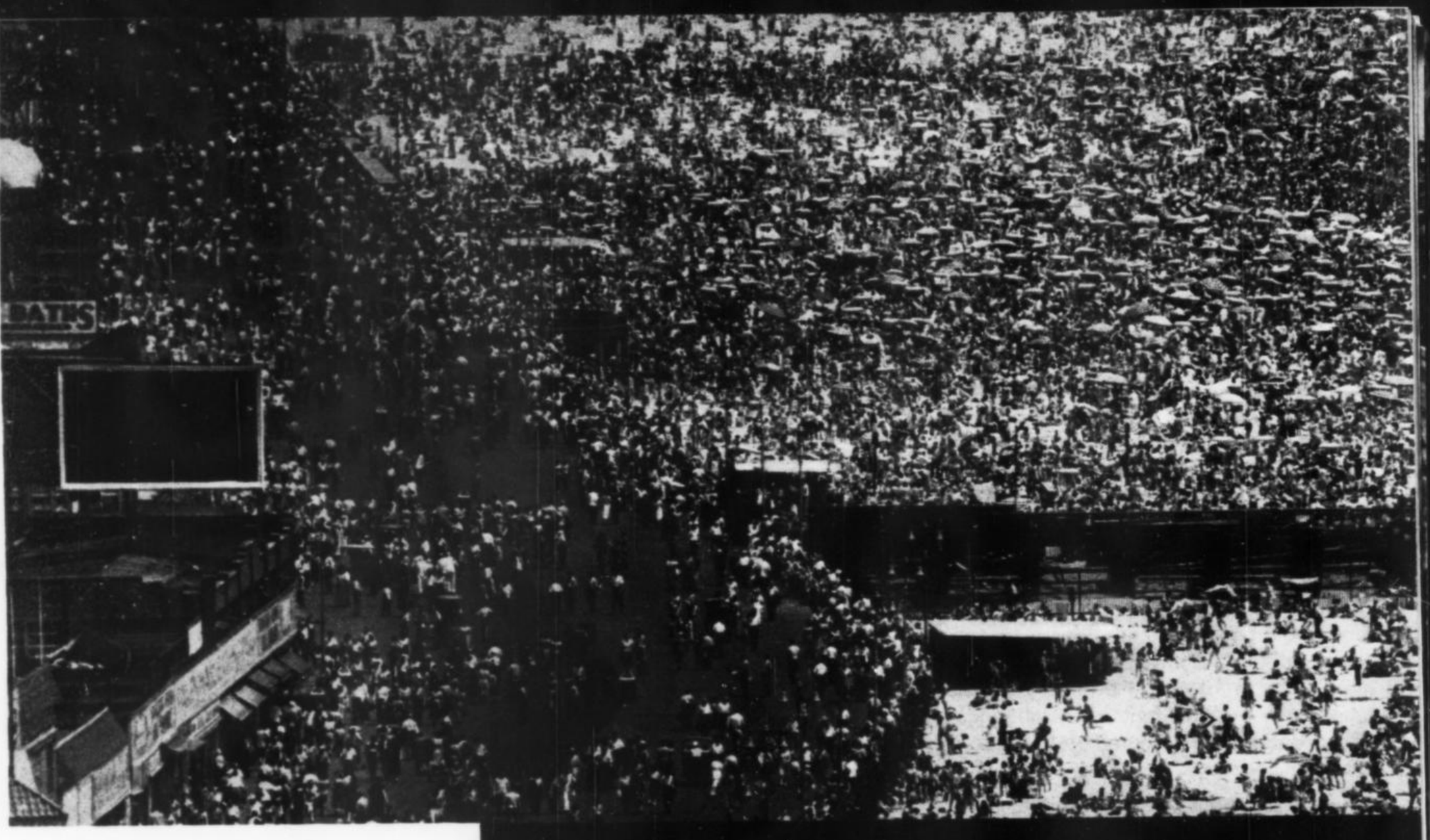


Hillside stripped of every scrap of vegetation forms a "tree of erosion" pattern in this photo taken from 3,500 feet up. Erosion is like a cancer that eats away the land. It occurs when land has been abused through the destruction of trees, grass and other protective surface covering.

Photos USIS



Above right, scientific farming can restore sick land to health. Here, badly eroded tableland is being reclaimed by strip-cropping. This "bull's-eye" design is a strip-cropped field on a hilltop. The light circular rows are wheat; dark strips are fallow ploughed land. Right, harvest time in Oklahoma, one of the U.S.A.'s most prolific wheat producing states. Along with cattle, wheat is the backbone of the state's prosperous agricultural industry.



THE DEAD LAND *(Continued)*

surface drainage is often apparent in their vicinity. At worst, these dumps are a menace to human communities, as was experienced so tragically at Aberfan in Wales. We are slowly emerging into a world of different values in which space is seen to be getting short and derelict landscapes cannot be allowed to impinge on such a scarce commodity.

The recent marriage of ecology and landscape architecture has immense promise. The English counties of Durham and Northumberland have initiated schemes of vegetating pit heaps, with a success that promises to enrich and make beautiful the violated landscape. The National Coal Board of Britain has done much opencast mining in the North of England, and immense care is being taken to rehabilitate the landscape afterwards, to the extent of 11 per cent of the Board's income. Similar results can be found in Germany.

The strip mining and auger mining of the hills of Kentucky are leaving eyesores of dereliction along the faces of the hills, and the effects of watershed erosion which follow are having serious repercussions below these hills on the good soils of the Ohio River country. It is all the more distressing to hear that the coal is being mined for sale at the lowest possible price to that model of rehabilitation policy, the Tennessee Valley Authority.

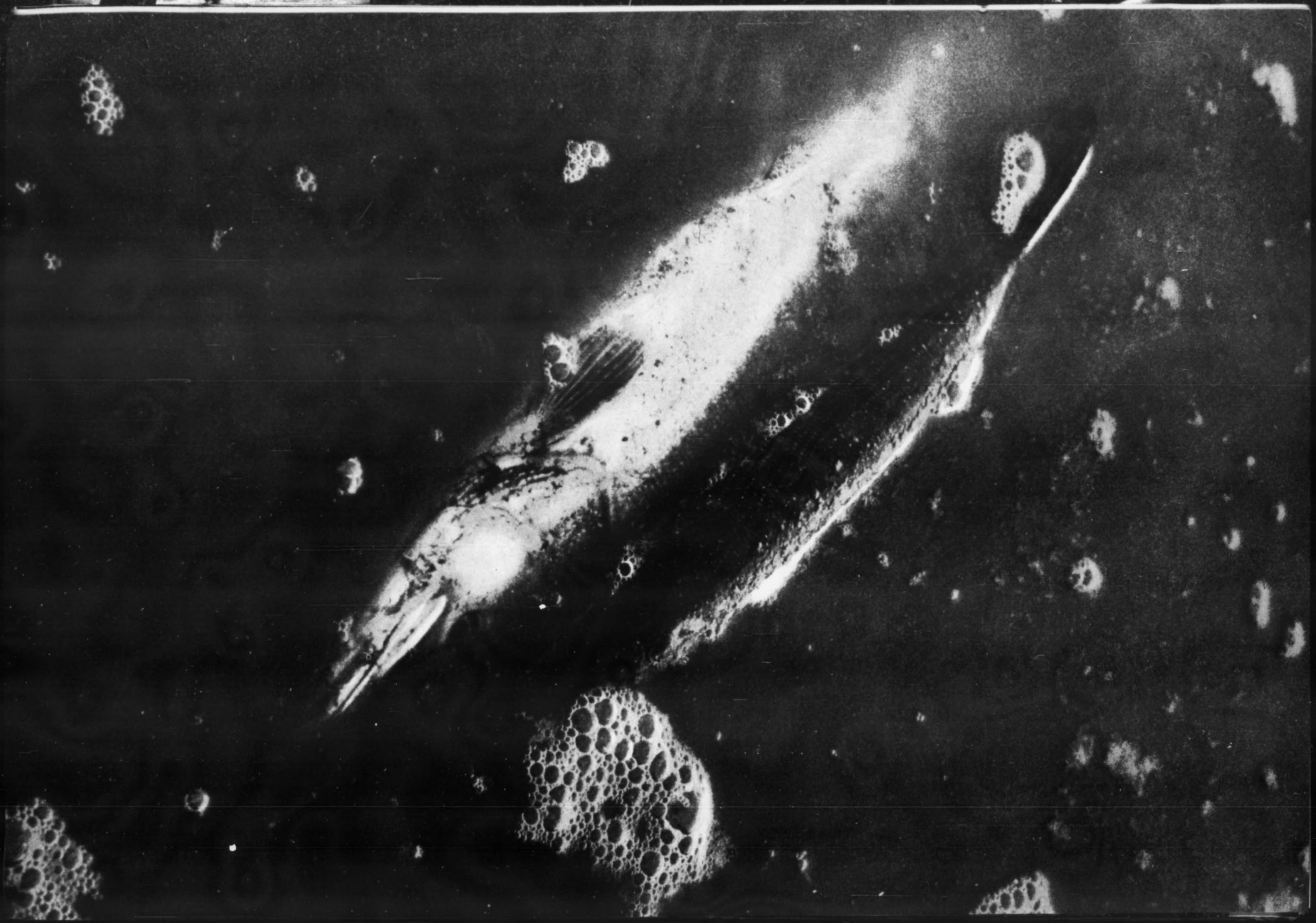
One of our difficulties in much conservation endeavour is to stop different agencies within one nation working to each other's disadvantage, never mind between nations. Once more we lack good legislation: the process of law being so largely by precedent, it can scarcely keep abreast of the types of change quite unimagined in the past.

Photo © Louis Renault - Photo Researchers, New York

Photo : Andreas Feininger

SOLITUDE: A MODERN LUXURY. Going to the beach on a hot day can be a refreshing experience and gives many city people a chance to have direct contact with the sea and nature. Not always, though—as photo on left sadly demonstrates.

MILLIONS OF CORMORANTS live unmolested on the island of San Lorenzo (below) despite its proximity to Callao, Peru's busiest port. The guano, or droppings, of these birds, which have sometimes accumulated to depths of as much as 150 feet, are one of Peru's most valuable resources. Guano (annual production now 300,000 tons) was long ago used by ancient Indian civilizations to fertilize the irrigated lands of Peru's coastal desert. For the past 50 years, the guano-producing islands have been rigorously protected by the Peruvian Government which has also cut off several peninsulas from the mainland to create ten new islands where the birds can breed in safety. Mass fishing of anchovies—the basic food of the cormorants—has been restricted so as to preserve the ecological balance that makes possible the production of guano (see the "Unesco Courier", March, 1966).



Man against Nature - 3

POLLUTION —THE NUMBER 1 PROBLEM

POLLUTION is the greatest problem of our age. No longer can we think of England's industrial north, Germany's Ruhr, the U.S.S.R.'s Donbass mining area, and a few other places, as being the polluted areas where money is to be made, but places not to be lived in if possible.

In the last quarter of a century we have polluted the whole planet so that the fat-storing creatures of the remote Antarctic continent, penguins and seals, carry appreciable quantities of organo-chlorine compounds in their fat, the compounds we commonly allude to as pesticides and which have not been used within many hundreds of miles of any part of the Antarctic continent.

We have learned now of the virtual cessation of reproduction in some species of birds which have not been the objects of any hard feelings, only of love and pleasure. We carry these pollutants in the fat of our own bodies and as yet do not know of any effects on us, good or bad, but most thinking people are concerned about the possible effect of accumulations of these compounds over the years.

Some developed countries have regulated the use of pesticides and cut down dosages, but this has meant the economic dumping of large quantities in tropical countries where there are pests enough and little control over the use of pesticides. The informed among us know that to regulate use in some countries but not on a world-wide basis does not prevent pollution of the biosphere. We are world citizens willy-nilly now.

Dumping of wastes into rivers is an obvious and well-documentated way in which we are bringing about change in the biosphere. The trouble arises from the primitive notion that a river is a natural sewer. Paper-making is a modern industry—in terms of centuries—which has been responsible for fouling many rivers of the forest countries. The U.S. State of Maine has a relatively low human population, but its rivers are polluted to an extent that precludes most of them receiving a run of salmon. Where human population is dense, sewage is the main problem.

Knowledge is being gained all the time of how to deal with industrial wastes, but regulation lags. Recent production of pesticides has had a few tragic sequels in the poisoning of rivers and ditches. In comparison, the carelessness of shepherds in draining out baths of sheep dip is a small thing, perhaps, but indicative of the thoughtlessness that spreads man's deleterious influences over habitats beyond the immediate vicinity. There has not been sufficient realization that much marine productivity on the continental shelf has an estuarine basis.

Much could also be said on radioactivity. In the recent past, the radioactive level has been increased in air, soil, water and living organisms over large areas of the world. Experimental atomic and hydrogen bomb explosions and some other works with radionuclides represent one of the greatest dangers for all living organisms on earth.

What might be the planetary profit and loss account in relation to expenditure and production of oxygen? We believe our atmospheric figure of 20 per cent oxygen has been built up through evolutionary time by the photosynthetic power of plant life, and the slow deposition of organic matter in the deep ocean sediments. So we may ask, when we hear that a jet plane crossing the Atlantic burns 35 tons of oxygen, is industrial process and combustion dipping seriously into the margin of production over consumption,

CONTINUED ON NEXT PAGE

The dead pike (left) symbolize the destructive effects of pollution in our rivers, lakes and waterways today. Throughout the world, water pollution is bringing untold havoc to fish and plant life, as well as ruining these areas for swimming and other recreational activities. At the turn of the century, 50 species of fish could be found in the lower reaches of the river Seine. Today, only a few diseased eels survive. It has been estimated that the pollutants in French rivers and lakes would fill 10,000 trains, carrying 6,000,000 tons. Thousands of lakes in Finland are now totally polluted. Lake Zurich in Switzerland is biologically dead: pollution has exterminated all its fish and other forms of life.

Photo © Yves Lanceau - Jacana, Paris

especially when we think of the rate of destruction of forest growth and other plant life.

Oxygen consumption and carbon dioxide production are to some extent linked; we know that the carbon dioxide content of the atmosphere is rising and that this could lead eventually to such raisings of temperature of atmosphere and oceans that there could be a substantial ice melt which would appreciably raise the level of the oceans. Pollution, combustion and destruction are combined here in their ultimate power of bringing change to the biosphere.

The deposition of sewage into rivers is of course age old. Lakes receive this effluent, and eutrophic conditions are being reported from as far apart as Lake Erie and Lake Baikal. Life in some lakes is being asphyxiated by lack of oxygen and too great a deposition of organic matter. Our river banks and lake sides are becoming overpopulated.

In order to be able to live at high densities we must process all sewage and wastes. We are definitely trying to mend our ways but not fast enough. London's River Thames is improving by civic action, and we must thank the sport of trout fishing for saving from pollution many streams that feed the Thames and other rivers in England.

The wreck of the "Torrey Canyon" focussed the attention of everyone on the growing hazard of heavy oil pollution of the sea and the secondary evil of detergents used to combat the oil, which kill more marine life than the oil itself. Responsible oil firms are taking the dangers of oil transportation by sea as a major task of research. Half the world's ocean cargo weight is oil—700 million tons of it in 1967, in 3,218 tankers.

Separators of improved design at ports, plastic booms round oil harbours, flocculants for spillage at sea, jelling agents to solidify oil in threatened tankers and new methods of loading and ballasting giant tankers, show a willingness on the part of the oil firms that we would be glad to see more commonly in shore-based industries that are potential pollutors of the environment.

Smoke, smog, sewage and detergents, these are the pollutants produced by modern man. We might also add noise. It is one more addition to bad environment engendering psychosomatic disease, that hidden fifth column in the sum total of our spoliation of our world. How long will it be before the individual has amenity rights, and the burden is laid on those offending?

ON THE WAY TO A GLOBAL DUMP

More than 200 million automobiles now use the world's roads. In cities, they dangerously pollute the air we breathe. Travelling 1,000 kilometres (600 miles), a car consumes as much oxygen as a human being does in a year, and in addition to lethal carbon monoxide, it emits annually about one kilogramme of lead. Certain countries now oblige motorists to install filters that reduce the amount of toxic gases given off. Another problem created by the proliferation of motor vehicles is how to dispose of wrecked and worn-out hulks. Increasingly they pile up (below) in hideous "cemeteries" which blight the countryside. The situation is so serious that certain countries have built huge scrap-metal plants that grind up old cars. Even the deserts do not escape the pollution of nature by man. Above, a dump of petrol cans deep in the Sahara.

Photo © John Craven - Fotogram, Paris

Photo © Francillon, Paris

WATER POLLUTION AND THE LAW

ALMOST every country in the world has tried to meet the threats of water pollution by means of legislative action. But passing laws does not automatically bring the situation under control. Unless legislation is supported by a strong climate of public opinion and unless adequate funds and staff to enforce the regulations are provided, the results are usually disappointing.

Because of the importance of legislative measures, both national and international, increasing attention has been directed toward this feature of pollution abatement. In recent years, the International Water Supply Association has devoted much time to the legal aspects of this problem. Similarly, the International Law Association, the International Association of Legal Science and the International Institute of Administrative Sciences have taken up these questions.

Where watercourses have formed the boundaries of, or crossed states, agreements, conventions and treaties have been entered into. Significant examples are those between Belgium and France, Bulgaria and Yugoslavia, and Switzerland and Italy.

Experience in the joint international management of watercourses is of long standing and is sometimes effective. But more often there have been delays in taking action to maintain an agreed quality of water acceptable to all countries concerned. Among other examples, this has occurred in the case of international arrangements on the Rhine and Lake Constance in Europe, on the Great Lakes in North America, and on the Rio Grande in Central America.

Wherever population density is high and hence pollution abatement calls for constant vigilance, continuing efforts will no doubt be made to establish at least common criteria and standards of water purity, and increasing discussions are likely to take place on the best ways of preserving the purity of waters.

The history of national legislation abounds with examples of declarations of good intention and high aspiration, but nowhere are these matched by equally high standards of implementation. Abatement of pollution has not been at a standstill. On the contrary, a great deal has been done, but not enough and not fast enough.

The situation was summed up succinctly a few years ago by a World Health Organization expert committee which declared: "Countries with severe laws against pollution have not in fact avoided the occurrence of widespread pollution. One reason for this may be that laws calling for no pollution at all do not represent a practical policy and therefore fall into disrepute. In a world becoming rapidly urbanized and industrialized, it is not possible to preserve rivers in their natural condition. The law should aim at controlling pollution."

In spite of such clear definitions of the situation, countries, large and small, under the lash of perfectionists and opportunists, continue to pass acts designed to recapture the pristine purity of past eras. The record of such legislation is far from gratifying as is pointed out by two important analytical studies published by the World Health Organization.

Man against Nature - 4

BLUEPRINT FOR PLANETARY MANAGEMENT

THE very rapid advances that characterize developing nations today have produced dramatic new kinds of interactions with the environment that were not so evident in earlier history.

Nowhere is the problem of accelerated development and its devastating consequences more evident than in many regions of the tropics and subtropics, where two-thirds of humanity now live. Here the relations between man and his environment are changing so rapidly that well-balanced development is seriously endangered and, in extreme cases, entire populations may be threatened with extinction as some actual examples reveal.

Owing to the rapid development of ever greater land areas and the widespread use of powerful technological methods, the various tropical biotic communities are today undergoing radical and extensive changes. Deforestation, irrigation, the introduction of exotic plants and animals, the large-scale use of weed-killers, the eradication of certain pathogenic agencies, etc., have transformed the tropical landscape more profoundly in ten years than the traditional agricultural and stock-raising methods in ten centuries.

In addition to economic advantages, immediate and undeniable, this "re-ordering" of the tropical ecosystems has sometimes entailed a sudden collapse of the balances, generally going back thousands of years, between Man and his environment and given rise to unexpected difficulties.

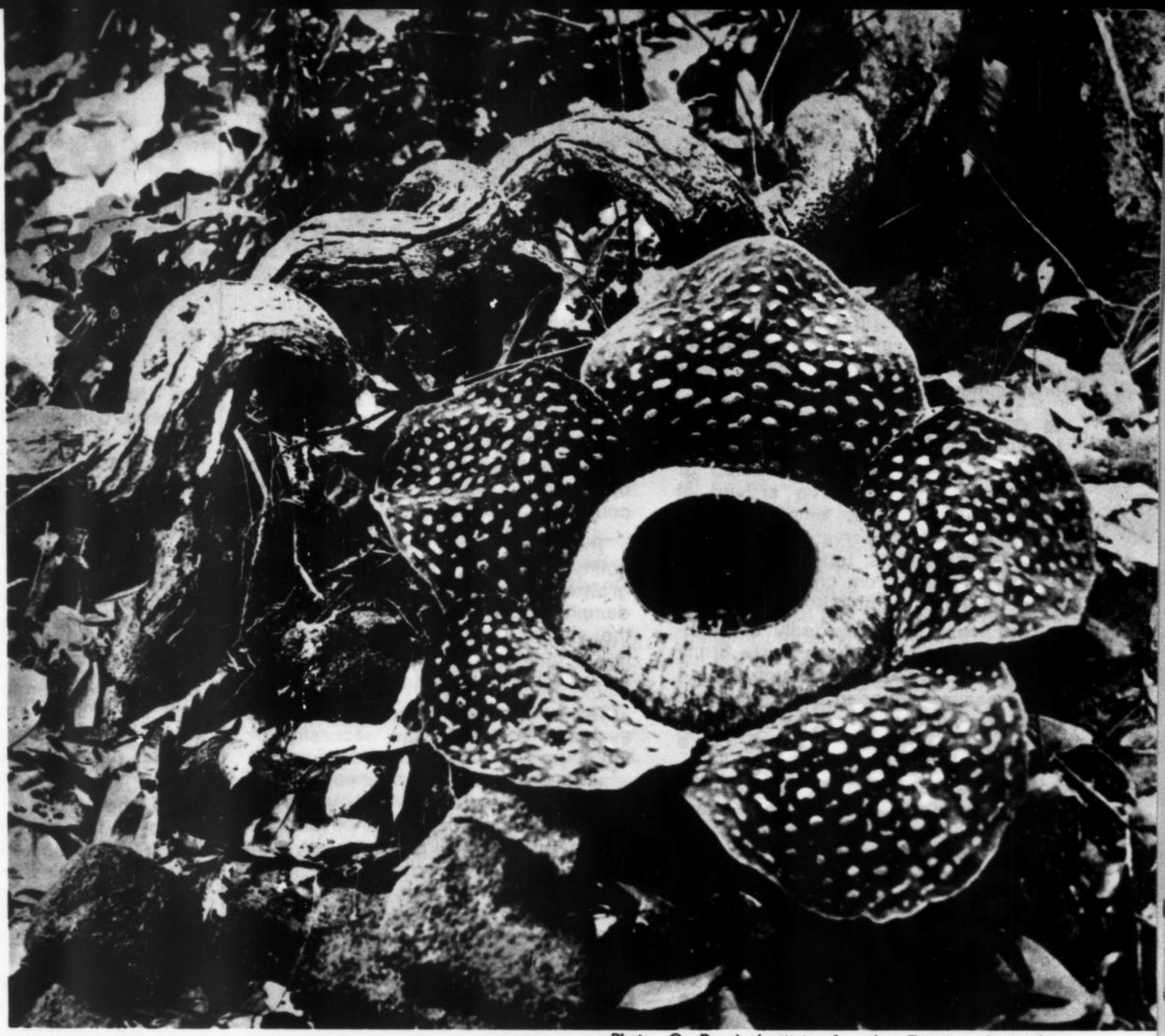
The introduction of livestock into the savannas of tropical America has promoted the increase of rabies-transmitting haematophagous vampires. Irrigation of the savannas of the Sahel in Africa has entailed the spread of bilharziosis. Systematic deforestation has frequently brought about transmission to men and domestic animals of certain arboreal viruses, normally confined to the pathogenic cycle of the forest canopy. Some are capable of causing sickness of little gravity to monkeys and tree-dwelling rodents, but they can be much more dangerous to humans; yellow fever, dengue-fever, Kyasanur forest disease, etc.

The abandonment of certain traditional foods, both animal and vegetable, or their replacement by other kinds of food more easily produced has often served to aggravate already existing nutritional deficiencies. Even eradication of a number of tropical diseases may cause long-term difficulties.

In Africa, as in Asia and tropical America, the last twenty years have seen the rampant spread of bidonvilles, shantytowns, barrios and favel-

Photo © Emile Schulthess - Rapho

The graceful lotus figures widely in the religious symbolism of Buddhism and has long inspired poets, architects and artists in every part of Asia. The plant is no less appreciated for its qualities as a nourishing foodstuff. The Chinese relish its vitamin-rich tubers, for which the men, in photo left, are searching on the bottom of a lake. The underwater harvesters have improvised handy headgear from the plant's broad leaves.



The world's largest plant, and one of the rarest, is this Rafflesia which can attain a width of 3 feet. Growing in Malaysia, it is named after a zealous British amateur scientist, Sir Stamford Raffles. Stemless and leafless, it springs from a fungus-type growth which attaches itself to the stumps or roots of vines or creepers. This species of Rafflesia has five pinkish-yellow petals, but its beauty is only skin deep—it smells like putrid meat and attracts flies on which its fertilization depends. In most parts of the world, rare or threatened species of plants are now protected in special reserves.

Photo © Royal Institute for the Tropics, Amsterdam

has of every description, whose crowded inhabitants are all too often undernourished, illiterate and have been frequently ruthlessly severed from their traditional values.

The pathology of this situation, which is still little known, is a combination of the effects of malnutrition and poverty, and the physical and psychical effects of manifold stress. It has resulted in the creation of a sub-proletariat in poor physical condition, which deprives agriculture of a source of manpower but, at the same time, is unable to offer skilled labour to industry. As regards public health, sanitary conditions in these shantytowns represent a constant menace to the great urban centres of which they are a part.

The lure of new cities and industrial centres involves unprecedented population movements which are the cause of a demographic imbalance that is in every way detrimental to the development of many tropical countries. These migrations are, moreover, frequently selective: they tend to leave the less enterprising groups or individuals behind in the rural areas and to condemn the majority of the better elements to chronic unemployment. Populations biologically well adapted to a special environment (the high plateaux of the Andes, for instance), sometimes find themselves moved by these migrations into areas climatically unsuited to them.

These problems—and there are many of this kind—require urgent study by teams of specialists, including ecologists, medical experts, psycho-sociologists and economists, with a view to finding satisfactory solutions as quickly as possible. Tropical ecosystems are at once so numerous, complex and delicate that nothing could be more detrimental to the interests of the human beings who inhabit them than a pure and simple "transplantation" to the tropics of techniques (and sometimes even of ideas) which have proved their effectiveness in the temperate latitudes.

Irrespective of past and present mistakes, and of the new problems created by accelerated development due to demographic, economic and social growth, man has already in the past tried to solve these problems of habitat deteriorations; and new ways of thinking and changing technologies give him the desire and the possibilities to build or rebuild an environment which has the quality required for mental health as well as to provide the necessary goods and services. Some examples are given below:

■ **Enjoyment of nature** as the hand of man has arranged it, by people at many levels of society is now a well-established fact. There are the great villas of the past, their gardens and the manipulation of water for aesthetic pleasure. We can think of China, Rome, Persia and Renaissance Italy, the architectural gardens of France and the English *jardin intime*. The parks of Capability Brown, in England, could not be enjoyed by his patrons as we can enjoy them now with the trees at their maturity. Gardening is becoming enormously popular and municipal authorities are gaining confidence in spending money on their public parks. Increased affluence creates a demand for environmental amenity.

■ **National parks** are a major contribution to civilization from conservation-minded people who had a vision of future human aspirations.

The best results of conservancy and the study of wild nature have been achieved through the establishment of reserves and national parks with a staff of scientists working permanently in them.

CONTINUED ON NEXT PAGE

■ **Establishment of wilderness areas and natural areas** are prompted by both spiritual and aesthetic concern and biological need. There is a widely diffused element of human feeling that wishes there to be wildernesses. Even if many individuals never reach the wilderness, there is satisfaction and comfort in the knowledge that it exists. Biologically we need the natural areas as reservoirs; their study can provide datum lines from which we can more intelligently study other environments.

■ **Conservation agriculture** can also help us to preserve our environment. Some tribes of people in limited or constricted habitats have arrived at conservation practices empirically, but the science of conservation in farming and water relations, together with forestry, has come from change of heart after orgies of exploitation.

One would say guardedly that conservation agriculture was fairly firmly established in developed countries, but these same developed countries have made some shocking mistakes in underdeveloped countries . This now could be arrested if the necessary preliminary studies concerning sites' potentialities and limitations and the necessary investments for conservation are made. We have the tools and we must use them correctly.

■ **Outdoor sports** in many forms in developed countries lead to care of the environment. Care of rivers has been mentioned already in the interests of fishing; a diversified agriculture and the maintenance of strategic woodlands and covers has been followed in western countries in the interests of sport.

Sometimes sport has removed animals from large areas, but understanding of the ecological place of predators is bringing about much greater tolerance. All in all, farms run by those who like to keep the sporting interest are richer in a variety of plant and animal life than others. Sometimes, the sporting farmer progresses to the state of being a definite naturalist enjoying specifically the natural life of no sporting interest.

■ **Changes in industry** have also played their part. This can best be presented by examples. In the United States, agriculture moved from the eastern seaboard to the Middle West. The forests that had never relinquished their hold took over again. Even 60 years ago much wood was being cut for fuel in these eastern forests. Now, oil-fired central heating is fairly general and the woods have grown more beautiful. What is more, the eastern woods have reached a new high destiny, of being the Suburban Forest, the Pleasance of the urban communities of the seaboard. Public opinion is now solidly behind maintenance of this pleasing region of the East.

Likewise, in Europe, the concentration of agriculture on the best soils and the consequent abandonment of marginal lands, have opened the way for rural area development based on afforestation for soil conservation, forest management for timber production and recreation, establishment of national parks, and, generally speaking, conservation, recreation and extensive management of natural resources.

In conclusion, do all these examples give us reason to be optimistic? Ecologists can scarcely afford to be optimists. But an absolute pessimist is a defeatist, and that is no good either. We see there need not be complete disaster and if our eyes were open wide enough, world wide, we could do much towards rehabilitation.

The biggest danger of all is our inability to control the explosive rate of growth of human population. A real damping down of this would lessen the all too frequent policy of expediency, bolstered by technology divorced from the philosophy of science.

The scientist as a social entity must eventually establish the necessity for the ecosystem approach to world problems as a safeguard against unbalanced technological action. We have yet to realize that political guidance and restraint is nothing like so operative on technology as on other major fields of human action.

BOOKSHELF

UNESCO BOOKS ON NATURAL RESOURCES

■ **A Review of the Natural Resources of the African Continent**
1963 (cloth $13.50; 67/8)

■ **Agroclimatological Methods (Proceedings of the Reading Symposium)**
1968 ($14.00; 82/-)

■ **Agricultural Planning and Village Community in Israel**
Edited by J. Ben David
1964 ($2.50; 12/6)

■ **A History of Land Use in Arid Regions**
By L. Dudley Stamp
2nd Imp. 1965 ($12.00; 60/-)

■ **Geography of Coastal Deserts**
By Peveril Meigs
1966 ($6.50; 33/-)

■ **Arid Lands**
A Geographical Appraisal
Edited by E.S. Hills
1966 ($15.00; 75/-)

Above books available through Unesco agents, see page 42.

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■ **The Ark Under Way**
Second Report of the World Wildlife Fund 1965-1967
Edited by Dr. Fritz Vollmar
The World Wildlife Fund
Morges, Switzerland, 1968

UNESCO has now embarked on its programme in education, science, culture and communication for 1969-70. The programme, approved by Unesco's General Conference in November 1968, together with a two-year budget of $77.5 million, confirms the priorities hitherto accorded to education, the natural sciences and technology.

Presenting the programme to the General Conference, Mr René Maheu, Director-General of Unesco, who was elected to a second six-year term of office, drew attention to what he termed the "four major crises"—the crisis in development aid, the crisis of human rights, the world crisis in education and the crisis of youth.

Of the youth crisis, he said: "It is *not* in fact a crisis of youth; it is a crisis of our society... and youth... reveals the strains and stresses in that society... I believe that, just as over the past ten years Unesco has given special attention to the developing countries, it must now couple this attention with a growing concern for youth."

In the programme now envisaged; Unesco will work not only *for* youth but *with* youth. In the next two years Unesco will hold several important meetings or conferences dealing with problems of youth: one in Uruguay on "Youth and Development," a second, on the impact on young people and adults of violence as portrayed by mass media, and a round table on university reform, to be held in Latin America.

Importance will be given to the participation of young people in all these conferences as well as others not dealing necessarily with youth problems.

Of Unesco's 125 member states, 70 sent ministers to the conference, which elected as its president Mr. William A. Eteki-Mboumoua, Minister of Education, Arts and Letters in Cameroon, from 1961 to 1968. Under his chairmanship, it debated and approved basic guidelines for Unesco's policy during the coming years:

■ Confirmation of the priorities accorded to education, natural sciences and technology.

■ Substantial contribution by Unesco to the Second Development Decade, which depends, "not only on the rational use of natural resources but on making the most of human resources by a co-ordinated process of education and training."

Unesco's programme for 1969-1970

■ Basic concept of the idea of life-long education, "embracing in industrial and developing regions alike all levels of the education systems, all forms of out-of-school education and even all policies for cultural development."

■ Recognition that the problems of youth "are an indication of a rapidly changing society", and the realization that a growing awareness of these problems must be the starting point of general progress to benefit students and young urban and rural workers.

■ Importance of the modernization of universities in which administrators, professors and students should all be involved.

■ An urgent need "to propagate the scientific spirit," and, at the same time, to define national science policies, allowing for the establishment of the necessary structures and staff training, "needed in the less favoured countries, to accelerate their development."

■ Growth in the contribution social and human sciences can make "in analyzing situations within societies and seeking new solutions".

■ Strengthening awareness of a common human destiny through mutual appreciation of cultural values and the preservation of the heritage and traditions of the past.

■ Use of modern information techniques for promoting educational activities and the scientific spirit.

■ In Unesco's world programme for the next two years, one of the projects in education is the development of pedagogical research, in co-operation with the International Bureau of Education (IBE), which is to be merged into Unesco as an international centre for the study of comparative education.

This year's International Conference on Public Education, convened by Unesco and IBE, will be devoted to the improvement of education systems. In 1970, Unesco will organize a regional conference, at the ministerial level, on education and economic planning in Arab States.

Aid programmes in educational planning will be continued and special attention given to problems of wastage and drop-outs at primary and secondary levels, and to the improvement of programmes and teaching methods. Aid in teacher training and the up-grading and re-adaptation of teachers will be expanded, particularly for rural areas in Africa and Latin America. Studies on special education for handicapped children are also planned for 1969-70.

Unesco's aid to literacy programmes will be continued and intensified, especially in the case of experimental pilot projects.

■ Unesco's programme in the natural sciences will now follow three main lines: science policy, scientific information and fundamental research; science education and technological training and research; environmental sciences and research on natural resources.

In 1970, Unesco will organize the first European conference of ministers concerned with science policy. In collaboration with the International Council of Scientific Unions, Unesco will continue its formulation of a world system for scientific information.

Unesco proposes to take a fresh look at science teaching at all levels by means of pilot projects involving new programmes and methods and improved teaching equipment. Other pilot projects will see what can be done to limit the effects of the "brain drain" of highly qualified personnel from developing countries. Unesco will also continue to help train scientists, engineers and technicians in countries where they are most needed.

Results of the first part of the Unesco-sponsored International Hydrological Decade launched in 1965, will be studied at a conference of specialists this year, and following the International Conference on the Biosphere, in September 1968, an interdisciplinary programme on "Man and the Biosphere" will be mapped out (see page 4).

■ While continuing its survey on the main trends of research in the social and human sciences and its promotion of teaching in these fields, Unesco will sponsor studies and hold a symposium on the contribution the social sciences can make to social and economic planning and development. Other studies will be made on different aspects of demography and on family planning in relation to education.

Unesco's programme of studies of different cultures (Oriental, African, Latin American, Balkan, Scandinavian, among others) in terms of their universal significance will be continued. Unesco will promote cultural development by encouraging the creative arts and art education and by promoting wider diffusion of art and literature.

■ As for the preservation of mankind's cultural heritage, Unesco will organize the first world conference of ministers of culture next year. Other salient features of Unesco's cultural programme are the adoption of an international Recommendation for the protection of cultural property endangered by public or private works, studies on the problems of Venice and the campaign to save the monuments of Philae in Nubia (see the "Unesco Courier", December 1968).

■ Lastly, as regards communication —in the broadest sense of the term— Unesco's activities are two-fold. Firstly, it will continue to promote the improvement of documentation services, nationally and internationally, and will assist member states to develop documentation centres, libraries, archives and statistical services. Secondly, it will continue to foster the free flow of ideas by word and image, studies abroad, book promotion and the development of information media, especially as these relate to education.

One of the new projects to be launched in 1969 is a wide-ranging study on the international travel of persons whose occupations relate to areas of Unesco's competence. The survey will begin by charting and assessing the pattern of travel of scientists, engineers and technicians, data being gathered on the numbers, countries of origin and categories of these specialists, on the types of study and length of stay abroad and the use made of the knowledge and skills thus acquired.

The role of communication in society, and the question of agreements covering the use of satellite communications for televising educational, scientific and cultural programmes will be discussed at two meetings this year.

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For further facts we refer readers to Unesco's official monthly publication, "The Unesco Chronicle," whose December 1968 issue is devoted to the decisions of the 15th Session of Unesco's General Conference. Published in English, French, Spanish and Arabic editions, it can be obtained from Unesco National Distributors (see inside back cover). Annual subscription: $3.00; 18/-; 10 F.

Letters to the Editor

SEGREGATED PROGRESS

Sir,

I cannot understand why you are opposed to apartheid. What is there to condemn in a policy of separate development? In a society composed of different races at different levels of development, each can make the best progress in its own allotted sphere. The best solution is racial segregation which prevents clashes and rivalry. Separate development leading to the creation of Negro states should certainly not be labelled as colonialism or the oppression of Negroes by whites.

G.M. Barbier
Paris, France

A RELIABLE SOURCE...

Sir,

In view of the anti-Western outlook of your magazine, I wish to cancel my subscription. It so happens that I receive complimentary copies of the "Revue de l'Afrique du Sud" (South African Review) which keeps me better informed on the problems of Africa.

Paul Le Reste
Hennebont, France

CAPTURING WORDS IN FLIGHT

Sir,

Francesco Salis gave us a fascinating account of his literacy teaching experiences in a Sardinian village, in your April 1968 issue (Literacy—Stairway to Development). It showed us how vital it is to adapt teaching methods to a country's living conditions and customs. In Sardinia, the factor which speeded the progress of literacy was shorthand. Why shorthand? Francesco Salis uses the phrase "the magic of capturing words in flight". It was this that appealed to the Sardinians who saw in their new skill a means "to capture in flight" the verses recited at the island's "Sagras" or poetry tournaments. This example shows us how wrong it is to have preconceived ideas about teaching people to read and write. Teaching should take account of a community's innermost aspirations and tastes. Such methods could surely be applied in numerous other fields.

S. Aviron-Violet
Lyon, France

ABUSE OF DRUGS

Sir,

I warmly welcome your Drug Abuse issue of May 1968, as it gives me something of substance and official standing to use with my colleagues, who seem often so strangely reluctant to believe in the harmful effects of drugs—LSD and marijuana in particular. I am having several copies sent to key persons on campus, and will keep one or two to use with my students abroad. Work with students has convinced me, even without medical research, that these drugs can be dangerous; that drug usage is widespread among our students and has increased at a very rapid rate in the last two years is also obvious. I welcome the sense of urgency expressed in the "Unesco Courier".

E. Ewen Gardner
Field Director
Antioch University
Studies Abroad
Ohio, U.S.A.

Sir,

We were deeply interested by your issue devoted to the dangers of drugs. The International Council of Women expressed its concern on this subject at its executive meeting in London in September 1967. Furthermore, the ICW Standing Committee on Health is carrying out an enquiry among the National Councils of Women affiliated to the ICW on "The growing use of drugs".

Brenda Noakes
Deputy General Secretary
International Council of Women
Paris, France

OF UNIVERSAL CONCERN

Sir,

I am surprised the "Unesco Courier" has published nothing on the situation in Biafra. Surely, in terms of human solidarity and civilization, this is a subject on which world opinion should be kept fully informed.

Paul Bresson
Versailles, France

UNESCO CLUB IN EMBRYO

Sir,

We are a group of about ten young people who lack neither enthusiasm nor the will to work. Looking through a copy of your special number on Youth (July-August 1965), we all agreed that your magazine does a worthwhile job in enabling the peoples of different countries to learn more about each other. We were especially interested in this particular number. It told us about the activities of youth in many countries and about the hundreds of Unesco clubs which are now active in all parts of the world. We would like to know how such clubs are set up and what sort of activities are included in their programmes. We would like to start a Unesco club here.

Abdessalim Belmouloud
Algiers, Algeria

ON THE RIGHT LEVEL

Sir,

You will be interested to know that the "Unesco Courier" is shelved conspicuously at eye level in the general reference room of Detroit's main library. That's how I happen to be writing you: I came on it as I browsed for publications that might have assignments or contracts for free-lance work.

Geraldine McIntosh
Detroit, U.S.A.

Sir,

When I read some of the "Letters to the Editor" I hardly know whether to laugh or cry! Criticism is permissible and indeed necessary. But people should realize that an editor cannot always deal with every theme which interests certain readers.

Frankly, I think your magazine is outstanding, the texts carefully balanced and the illustrations excellent. The "Unesco Courier", which is doing a fine job, stands out head and shoulders above many publications.

Paul Strittmatter
Berne, Switzerland

Sir,

Your magazine is a firm favourite with young people in Cuba. When a new issue goes on sale, people often queue at the news-stands, and copies are sold out before everyone has had one. I want to take out a subscription so I can read the "Unesco Courier" regularly.

Alina Diaz
Pinar del Rio, Cuba

PAUSE FOR THOUGHT

Sir,

I thought you would like to see, from this photo, that some working men of Manzanares, central Spain, spend part of their lunch break reading the "Unesco Courier". We have quite a long way to go from our homes in the city to the factory where we work. When we stop for a rest, we also take it in turn to read aloud from the "Unesco Courier" and other Unesco publications, and this often leads to lively discussions.

José Antonio Pinés
Manzanares, Spain

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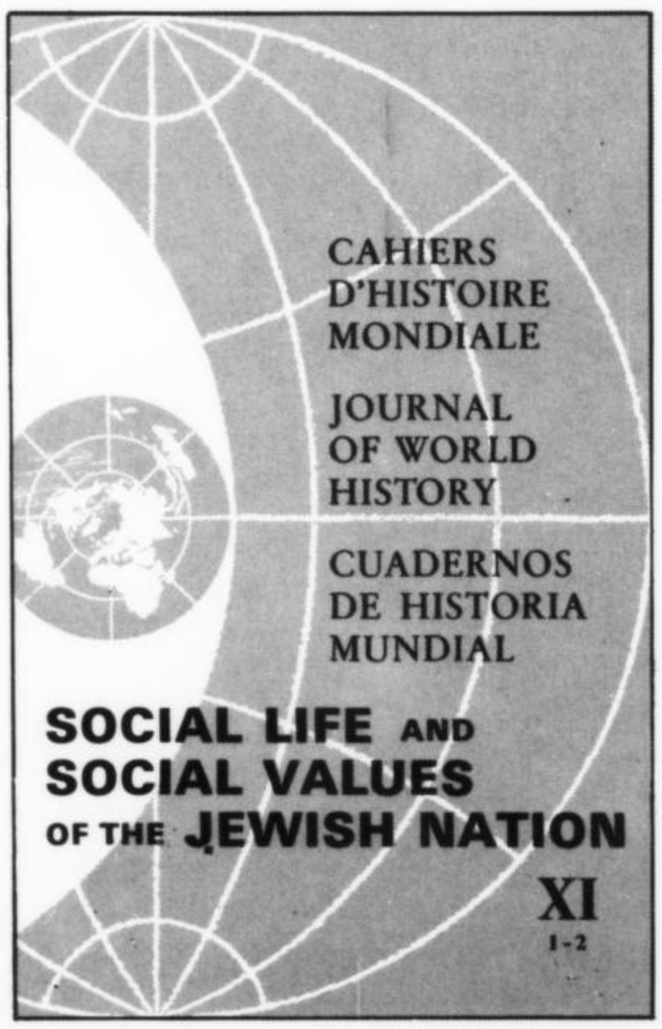

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SPACESHIP EARTH
—a delicate balance between Man and Nature

How our planet looks from 90,000 kilometres (56,000 miles) away—a remarkable photograph taken by the Soviet spacecraft "Zond 5" on September 21, 1968. After exposure, the film was not radioed back but returned to earth for development in a laboratory, hence the exceptional clarity of the picture. Between the cloud formations can be seen the African continent, the Arabian peninsula, the Middle East and parts of Spain, Italy and the Balkans. On far right are the Black Sea, the Caspian Sea and the Sea of Aral. It is midday on the Red Sea and 9 a.m. in Spain. On far left, the Americas are still in darkness, but within minutes the sun will rise over the north-east tip of Brazil. This issue is devoted to Man and the Biosphere, that is, Planet Earth and man's centuries long destruction of his environment, which now seriously threatens the balance of nature.

Photo : APN